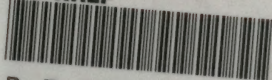


UC-NRLF



B 2 957 467

~~Presented to the University of California~~

LIBRARY

OF THE

UNIVERSITY OF CALIFORNIA.

GIFT OF

J. A. Allen

BIOLOGY
LIBRARY
G

Class

CONTENTS

1. Five new American rodents.
2. New rodents from Colombia and Venezuela.
3. The generic names *Echimys* and *Loncheres*.
4. Note on the wood bison.
- 5.. Bats collected by H.H.Smith in the Santa Marta region of Colombia.
6. Birds collected in the district of Santa Marta, Colombia.
7. Note on the generic names *Didelphis* and *Philander*.
8. Descriptions of new American marsupials.
9. Mammals collected in southeastern Peru.
10. Two new species of South American Muridae.
11. Further collection of mammals from southeastern Peru.
12. The musk-oxen of Arctic America and Greenland.
13. A new caribou from Kenai peninsula, Alaska.
14. North American opossums of the genus *Didelphis*.
15. Two new opossums of the genus *Metachirus*.
16. The generic names of the Mephitinae.
17. New South American Muridae and a new *Metachirus*.
18. Zimmermann's 'Zoologiae geographicae' and 'Geographische geschichte' considered in their relation to mammalian nomenclature.
19. Generic names of the Mephitinae.
20. A new caribou from the Alaska peninsula.
21. A new bear from the Alaska peninsula.
22. A new caribou from northern British Columbia.
23. A new sheep from the Kenai peninsula.
24. Nomenclatorial notes on American mammals.
25. South American opossums of the genus *Didelphis*.
26. The name of the Argentine Viscacha.
27. Mammal names proposed by Oken in his 'Lehrbuch der zoologie'.
28. A new caribou from Ellesmere Land.
29. The hair seals (family Phocidae) of the North Pacific ocean and Bering sea.

QL701

A5

V23

BIOLOGY
LIBRARY
G

*Descriptions of Five New American
Rodents.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XII, ARTICLE II, pp. 11-17.

New York, March 4, 1899.



BIOLOGY
LIBRARY



Article II.—DESCRIPTIONS OF FIVE NEW AMERICAN RODENTS.

By J. A. ALLEN.

Lepus americanus phæonotus, subsp. nov.

Summer Pelage.—General color above pale yellowish gray varied strongly with black; top of head more strongly suffused with fulvous; an indistinct blackish median dorsal line; ventral surface white, with a yellowish brown pectoral band.

Winter Pelage.—Similar to that of *L. americanus*, except that the zone of fulvous underfur is paler and less extended, and the white tipping of the hairs is much longer.

Length, 488; tail vertebræ, 56; ear from crown, 88; hind foot, 139. (This is the largest specimen of the series, and the only one having the collector's measurements.)

Type, $\frac{449\frac{1}{2}}{330\frac{1}{2}}$, ♂ ad., Hallock, Kittson Co., Minn., Nov. 19, 1891. Collected and presented by Dr. Edgar A. Mearns.

L. americanus phæonotus differs from *L. americanus*, from Northern New Brunswick, in being somewhat smaller, and in the grayish general effect of the summer pelage, in contrast with the strong yellowish brown of *L. americanus*. In general it shows a decided deviation, in both size and coloration, towards the *Lepus bairdi* group.

This Hare is represented by 4 specimens (in changing pelage) from Kittson Co., Minnesota, collected Nov. 19–22, 1891, by Dr. E. A. Mearns; by a young specimen from Mora, Kennebec Co., Minnesota, collected June 15, 1889, by Dr. Mearns; and by 4 in winter pelage from Moore's Lake, Todd Co., Minnesota, collected in December, 1874, and January, 1875, by J. H. Batty. The Todd County specimens, from near the southern boundary of the range of this form, have the underfur less pale and the overlying white less developed than in the Kittson County examples.

Lepus bishopi, sp. nov.

Size small; ears very small; hind foot, 115, as against 130 in *L. a. phæonotus* and *L. americanus*.

Summer Pelage (somewhat worn).—Above grayish brown tinged faintly with

[11]

pale yellowish, with a well defined, rather conspicuous median longitudinal blackish stripe; sides pale buffy gray; below white, with a broad pale yellowish brown pectoral band; inner sides of hind limbs whitish; of fore limbs whitish on proximal half; outer surface of fore limbs strong yellowish brown, of hind feet yellowish brown apically, yellowish brown mixed with white proximally, with the edge of thighs fulvous; head yellowish brown, brighter than the general dorsal surface; ears externally like the head for the basal half, passing into black apically, with a narrow fringe of white on outer border.

Length (approximate from skin), 350; tail vertebrae, 45; hind foot, 115; ear from crown, 55. Skull, total length, 75; zygomatic breadth, 35; mastoid breadth, 29; interorbital breadth, 18; width of postorbital constriction, 13; length of nasals, 28.

Type, No. $\frac{10796}{9094}$, ♂ ad., Mill Lake, Turtle Mountains, North Dakota, July 12, 1895. Collected and presented by Dr. L. B. Bishop, after whom the species is named.

Unfortunately *L. bishopi* is represented by only a single specimen, which differs so much from any form of the *L. americanus* group as to need no comparison with any of them, though most resembling *L. a. phæonotus*. In general features it more strongly recalls the *L. bairdi* group, but is darker even than the Colorado phase of *L. bairdi*, the only form of the group of which I have summer specimens. It is especially characterized by its remarkably small, narrow ears, which are smaller than in *L. mearnsi* of the Cotton-tail group.

***Lepus floridanus chapmani*, nom. nov.**

Lepus sylvaticus bachmani ALLEN, Bull. Am. Mus. Nat. Hist. VI, 1894, 170; *ibid.* VIII, 1896, 56. Not *Lepus bachmani* Waterhouse, 1838 = *L. trowbridgei* Baird, 1855.

In 1894 (*l. c.*) I adopted, following Baird, the name *Lepus bachmani* Waterhouse for the Texas Cotton-tail, considering that the type locality was probably Texas rather than California, as doubtfully given in the original description (P. Z. S., 1838, p. 104). Mr. Oldfield Thomas has recently (Ann. and Mag. Nat. Hist. (7), II, Oct., 1898, p. 320) announced that "on an examination of the type [of *L. bachmani*] now in the British Museum, I find that it is certainly a California hare . . . for, without any room for doubt, it proves to be the species commonly known as *L. trowbridgei*, Baird." A reëxamination of Waterhouse's description shows, rather through omission of prominent features

of coloration of the Texas Cotton-tail than by the characters given, that it really better fits *L. trowbridgei* than the Texas species, especially now that we can allow full weight to the small size given by Waterhouse for *L. bachmani*.

In renaming this strongly marked form it gives me pleasure to connect with it the name of my valued colleague, Mr. Frank M. Chapman, whose Corpus Christi collection, made in 1891, contained the first specimens of this form received at this Museum. I also take as the type of *L. chapmani* specimen No. $\frac{3909}{2983}$, ♂ ad., taken by Mr. Chapman at Corpus Christi, Texas, April 10, 1891.

Mr. Thomas having also shown (*l. c.*, p. 319) that the *Lepus sylvaticus* Bachman, 1837, is preoccupied by a *Lepus borealis sylvaticus* Nilsson, 1832, a new name for the group becomes necessary, and Mr. Thomas has suggested for it *Lepus nuttalli* Bachman, 1837, the type locality of which is "the Plains of the Columbia." As it is evident that true *nuttalli* is not a member of the 'sylvaticus' group, as now understood, I adopt for the group, in place of *sylvaticus*, the name *floridanus* (*Lepus sylvaticus floridanus* Allen), the next in date, given in 1890 to the form from Southern Florida. The eastern Cotton-tails will therefore stand apparently as below, with the type localities as there indicated.

1. *Lepus floridanus* (Allen), 1890. Sebastian River, Brevard Co., Florida.

2. *Lepus floridanus mearnsi* (Allen), 1894. Fort Snelling, Minnesota.

3. *Lepus floridanus transitionalis* (Bangs), 1895. Liberty Hill, Conn.

4. *Lepus floridanus alacer* (Bangs), 1896. Stilwell, Indian Territory.

5. *Lepus floridanus mallurus* (Thomas), 1898. Raleigh, North Carolina. (= *Lepus sylvaticus* Bachman, 1837, preoccupied by *Lepus borealis sylvaticus* Nilsson, 1832. Cf. Ann. and Mag. Nat. Hist. (7), X, Oct., 1898, p. 320.)

***Thomomys fulvus alticolus*, subsp. nov.**

Similar in size and cranial characters to *Thomomys fulvus anitæ*, but much darker and less fulvous in coloration. Above yellowish brown much varied with black, darkest along the median line. The usual dusky spot at posterior

base of ear; nose and edges of cheek pouches blackish. Below strongly washed with reddish fulvous, the hairs plumbeous for the greater part of their length; inside of cheek pouches and anal region white. Tail and upper surface of feet whitish or grayish white, the tail thinly haired.

Total length (collector's measurements) of type, 225 mm.; tail, 61; hind foot, 30. Three specimens (2 ♂♂, 1 ♀) measure: Total length, 216 (207-225); tail, 62 (61-63); hind foot, 30 (28-31).

Type, No. 415, collection of W. W. Price, ♂ ad. Collected by D. Coolidge, in Sierra Laguna (altitude 7000 feet), Lower California, July 10, 1896. (Type in British Museum.¹)

For the opportunity of examining these specimens I am indebted to the kindness of Mr. Oldfield Thomas, who, in sending them with other Lower California and Mexican material for determination, thus comments on their relationship to *T. fulvus anitæ*: "Presuming that all the Lower California *Thomomys* were the same I had not sorted them by localities, but on doing so for registration it comes out at once that the Sierra Laguna specimens are strikingly darker in color than the Santa Anita and San José del Cabo ones, so much darker that they must evidently be looked upon as distinct. The Sierra Laguna specimens come from an altitude of 7000 feet, the Santa Anita and San José ones from near the sea level." He adds: "I send 3 specimens, the brightest and lightest of 12. . . . No. 415 [here taken as the type] is about the average color, though several are darker, and one quite blackish. The Santa Anita specimens are all identical, and can be distinguished at a glance from those from Sierra Laguna."

This form is darker and much less gray than my *T. fulvus martirensis*, from the San Pedro Martir Mountains of Lower California, and also very much smaller. The question of whether these two mountain forms should not be treated as specifically distinct, not only from each other but from *T. fulvus*, must be left in abeyance, owing to the absence of proper material to show their relationships.

¹ I take this opportunity to correct an error in the introduction to my paper (this Bull., Vol. X, 1898, p. 143) published last year, in which several species were described from material kindly submitted by Mr. Oldfield Thomas for determination. In the "set of duplicates" retained by this Museum, the types of the new species were not included, as there stated, but were all returned to the British Museum.

***Reithrodontomys tenuis*, sp. nov.**

Similar to *Reithrodontomys fulvescens*, but much smaller and not so gray, with a much less hairy tail.

Above yellowish brown, finely lined with black; sides fulvous, forming a broad lateral line, poorly defined above, very prominent on the cheeks below the eyes. Below soiled grayish white (in one specimen slightly tinged with fulvous), the hairs pale plumbeous at base. Ears dusky externally, reddish within, covered with fine short hairs, with a reddish tuft at the anterior base. Tail grayish brown, slightly darker above than on the sides and below. Feet soiled white.

Total length (collector's measurements) of type, 152 mm.; tail, 81; hind foot, 20; ear, 15. Three specimens (2 ♂, 1 ♀) measure: Total length, 160 (152-170); tail, 87 (82-90); hind foot, 20; ear, 15.

Type, No. 217, Coll. W. W. Price, ♀ ad., Rosario, Sinaloa, Mexico, March 11, 1897. Collected by P. O. Simons. (Type in British Museum.)

This species is more nearly related to my *R. fulvescens*, from Oposura, Sinaloa, Mexico, than to any other yet described. It is, however, much smaller, being intermediate in size between this species and *R. longicauda*, the total length being 160, and the length of tail 87, as against 176 and 100, respectively, in *R. fulvescens*. The general coloration is also more strongly fulvous above, particularly posteriorly, and there is a tendency to a fulvous tinge below in contrast with the clear white of the lower parts in *R. fulvescens*. It needs no comparison with any member of either the *R. mexicanus* or *R. longicauda* groups. The skull presents nothing diagnostic.

I am indebted to Mr. Oldfield Thomas for the opportunity to examine the three specimens on which this species is based.

***Peromyscus texanus subarcticus*, subsp. nov.**

Peromyscus leucopus arcticus ALLEN, Bull. Am. Mus. Nat. Hist. VII, 1895, 268; *ibid.* VIII, 1896, 252. (Not *arcticus* of Mearns.)

Intermediate in size and coloration between *P. texanus nebrascensis* and *P. texanus arcticus* but very different from either.

Above dusky brown suffused with very pale fulvous, darker and more blackish over the middle of the back, more fulvous on the sides; feet and lower parts pure white; tail sharply bicolor, the middle third above blackish brown; sides and beneath white; ears dusky, narrowly edged with white.

Total length (of type), 165; tail vertebræ, 66; hind foot, 19. Average of three specimens from the type locality (Deerlodge Co., Montana), total length, 162; tail vertebræ, 61; hind foot, 19.2.

Type, $\frac{10107}{8411}$, ♀ ad., Aug. 13, 1894. Collected by Prof. L. L. Dyche.

P. t. subarcticus differs from *P. t. arcticus* in the general effect of the color of the upper parts being dusky brown instead of blackish brown, in the much more heavily clothed tail, and smaller size (in the average of specimens referable to this form). It differs from *P. t. nebrascensis* in being dusky brown above instead of cinnamon brown.

I refer to this form not only the Black Hills (South Dakota) specimens formerly referred by me (*l. c.*) to *arcticus*, but also a series of six specimens collected at Osler, Saskatchewan (received in exchange from Mr. O. Bangs). The latter agree exactly in color with the Montana series of *subarcticus*, but not at all well with the series from the Upper Liard River region in the Stone collection (see above, p. 8), which are fresh, unfaded specimens of true *arcticus*. The Black Hills specimens are not all typical, some of them decidedly approaching *P. t. nebrascensis*, while others are quite like the Montana and Saskatchewan examples. To *subarcticus* must also be referred the specimens from Colorado, Wyoming, and Utah, formerly placed by me under *arcticus* (*l. c.*).

Sciurus chapmani, sp. nov.

Sciurus æstuans hoffmanni ALLEN & CHAPMAN, Bull. Am. Mus. Nat. Hist. V, 1893, 209; *ibid.* IX, 1897, 17. (Not of Peters, 1864.)

Similar to *Sciurus hoffmanni* (Peters) but smaller and differing in color and in cranial characters.

Above nearly uniform dull yellowish brown finely varied with black, the hairs individually plumbeous at base, and annulated on the apical half with pale fulvous and black, with the tip usually black; the sides of the body are uniform with the back, there being no tendency to a darker median band. Below reddish fulvous, varying in different individuals from pale orange to deep reddish orange, lighter on chin and throat. Outer surface of limbs and feet like the dorsal surface; inner surface of same like the ventral surface. Tail dark brown above, the hairs tipped and the edges of the tail fringed broadly with dark chestnut red; the hairs individually are ringed with two bands of pale fulvous alternating with two of black, besides the red tipping, the two outer bands being broader than the two inner; these bands are hidden on the dorsal aspect by the red tips of the hairs, but below are plainly visible.

Total length (collector's measurements) of type, to end of tail vertebræ, 370 mm.; tail vertebræ, 162; hind foot (with claws), 46; ear, 19. A series of 7 adults (2 ♂♂, 5 ♀♀) measure as follows: total length, 376 (367-390); tail vertebræ, 174 (162-192); hind foot, 46 (44-48); ear, 19 (18-20).

Skull, total length, 49; width behind postorbital processes, 17.6 (average of 5 adult skulls).

Type, No. $\frac{7322}{5936}$, ♂ ad., Caparo, Trinidad, March 19, 1894. Collected by Frank M. Chapman.

This species differs from *Sciurus hoffmanni* (Peters) in being less dark above, in the rather brighter tint of the under parts, and in the red of the tail being of a much darker shade,—chestnut red instead of orange red. It is also somewhat smaller. In *S. chapmani* the rostral portion of the skull is narrower, and the fronto-parietal suture is transverse or a little concave anteriorly, while in *S. hoffmanni* there is a sharp convexity backward at the median line.

Both *S. hoffmanni* and *S. chapmani* differ very strongly from the Brazilian *S. æstuans* in much larger size and much deeper colors, particularly of the underparts and the tail.

The series of Trinidad Squirrels on which the present species is based were referred provisionally in 1893 (*l. c.*) to *Sciurus æstuans hoffmanni* Peters, with the remark that these ten specimens “prove to be much nearer subspecies *hoffmanni* from Costa Rica, both in size and coloration, than to the true *æstuans* of Brazil, although clearly intermediate between the two, as respects both size and coloration.” While this statement is true, an examination since of considerable additional material from Costa Rica, Colombia, and Brazil, renders it evident that the Trinidad form is sufficiently distinct to warrant recognition as an insular form of the group. It is furthermore evident that true *æstuans* and *hoffmanni* should be recognized as distinct species. At least I have seen no specimens that connect the two forms.

This species is named for my colleague, Mr. Frank M. Chapman, in recognition of his important contribution to our knowledge of Trinidad mammals and birds.



The Knickerbocker Press, New York

2

*New Rodents from Colombia and
Venezuela.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XII, ARTICLE XVI, pp. 195-218.

New York, December 20, 1899.

The Knickerbocker Press, New York

Article XVI.—NEW RODENTS FROM COLOMBIA AND VENEZUELA.

By J. A. ALLEN.

Through the liberality of Mr. Morris K. Jesup, President of the American Museum of Natural History, the Museum has been placed in possession of one of the most extensive and best prepared collections of mammals that has probably ever been brought together from a single limited locality in South America. This collection has been made mainly in the vicinity of Santa Marta, Colombia, in the coast region below an altitude of 500 feet; a part, however, was collected in the lower portion of the Sierra region, at altitudes varying from 4000 to 6000 feet. The collection was made under the direction of Mr. Herbert H. Smith, the well-known natural history explorer who has done so much excellent work, under various auspices, in Southern Brazil, in the West Indies, and in Mexico, by his wife, equally well known as an expert zoölogical collector, aided by a corps of assistants. Through the aid of Mr. Jesup, the Museum has purchased all except the duplicates of this collection, which latter, however, are still at the Museum, and, with Mr. Smith's generous consent, will be used as the basis of a later report on the mammals of the Santa Marta district. In the present paper only the Rodents receive treatment, and these only so far as to make known the forms that appear to be new. Mr. Jesup has also purchased for the Museum Mr. Smith's collection of birds thus far made in the same region, numbering upward of 3000 specimens.

The Venezuelan forms here described are from a small collection of mammals made by Mr. F. W. Urich, in the mountainous district situated about ninety miles from Cumana. This collection, numbering only about 75 specimens, proved of special interest, as, though not numerous in species, it contained several not previously described, as did also a small collection of birds made by Mr. Urich at the same localities and received with the mammals.¹

The external measurements given, when not otherwise stated, are those made by the collector from the fresh specimens.

¹ See *antea*, pp. 153-156.

Lepus (Sylvilagus) superciliaris, sp. nov.

Type, No. 15428, ♂ ad., Bonda, Santa Marta District, Colombia, July 4, 1899; Coll. H. H. Smith.

Color above pale buff, strongly varied with black, which in some specimens is quite the predominant color of the dorsal area; sides rather paler with much less black; nape patch rich rufous; frontal region, from the nose to a point opposite the posterior canthus of the eyes, deep rusty chestnut, with, or wholly without (in different specimens), a slight admixture of black-tipped hairs; crown paler rufous varied with black; sides of the nose and cheeks buffy white, more strongly colored and varied with blackish on the latter; a broad very distinct grayish-white ocular stripe, very narrow below the eye, broader and clearer above the eye, and forming a broad whitish patch both in front of and behind the eye; an indistinct blackish area midway between the eye and base of the ear; eyelashes black, the upper very long, thick, and intense black; above the ocular stripe is a very distinct narrow black stripe, separating the broad gray ocular stripe from the rufous of the frontal region; ventral surface including inside of limbs, pure white to the base of the fur; broad chest band strong buff, the fur pale gray at the extreme base; whole throat and chin white, like the abdomen, but the pelage shorter; fore limbs anteriorly pale rufous, passing into white or buffy white on the feet; hind limbs clear rufous posteriorly, passing into buff on the antero-internal border; top of hind feet white, sides buff mixed with white, especially on the inner edge, more deeply buff or pale rufous on outer edge; soles dingy buff, the fur more grayish basally; tail pure white below, above dull rufous, the hairs blackish below the surface, thus often giving a dingy rufous general effect; ears large, thinly haired, whitish gray at extreme base posteriorly, passing gradually to blackish on the apical third, with a narrow edging of pure white; the antero-exterior third is more heavily clothed and grayish buff, the buffy tint strongest at the base of the ear and passing gradually into blackish apically.

Young in first pelage resemble the adults in all details of markings and color, except that the dorsal area is more strongly varied with black, with a tendency to a median blackish area, shown also in some of the adults.

Measurements.—*Type*, total length, 400 mm.; tail vertebræ, 25; hind foot, 75, with claws, 87; ear (in dry skin), from notch, 55, from top of head, 72. Five adults measure as follows: total length, 394 (375–410); tail vertebræ, 31 (25–33); hind foot (with claws), 93 (87–100); ear (in dry skin) from notch, 53, from top of head, 65.

Skull, total length, 79; basal length, 59; greatest (zygomatic) width, 35.5; mastoid width, 26; interorbital width, 18; intertemporal width, 24; length of nasals, 33; width of nasals at base, 16; palatal floor, 7.5; from henselion to posterior border of palatines, 28.5; palatine foramina, 20 × 5.5; upper tooth-row, crown surface, 12, at alveolar border, 14; lower jaw, condyle to incisor tips, 59; height at condyle, 32.

This species is based on 11 specimens, 5 adult and 6 young, the latter of various ages, but mostly less than one fourth grown,

all taken at or near Bonda. They vary but little in coloration, —the adults mainly in the buff tint of the upper parts, which ranges from strong buff to pale buffy white.

Lepus superciliaris belongs to the *Sylvilagus* group of *Lepus*, and to the section represented by *L. insolitus* Allen of Colima, Mexico, with which it agrees in the general conformation of the skull, and especially in the deep grooving of the external face of the malar. It hence has no close relation to the subgenus *Tapeti*. It should be compared with *Lepus cumanicus* Thomas, from Cumana, Venezuela, which is doubtless its nearest ally, and with which it closely agrees in size and in general features. *L. cumanicus*, judging from the description, is much paler, and if the conspicuous black superciliary stripe so characteristic of the Bonda form is present in *cumanensis* it is not mentioned in the detailed description of the species. Also the deep clear rufous of the frontal region of the head in *L. superciliaris* is not mentioned in the account of *cumanensis*. The geographical and faunal relations of Bonda and Cumana, as indicated by the representation of other groups of Rodents in the two regions, point to at least a subspecific differentiation in the Hares of the two localities.

***Isothrix rufodorsalis*, sp. nov.**

Type, No. 14606, ♂ ad., Onaca, Santa Marta District, Colombia, Dec. 24, 1898; Coll. H. H. Smith.

Pelage very soft, almost woolly, full and long. Color of dorsal area deep rufous, paler yellowish rufous on the sides, including sides of head to the nose; a few long black-tipped hairs on the top of the head and nape; below, including inner surface of limbs, fulvous, passing insensibly into the color of the sides; whiskers, a tuft of long bristles between the eye and ear, and a tuft of long hairs at the inner base of the ear, intense black; ears small, pale brown, naked externally, but with numerous long hairs from the inner surface; upper surface of fore and hind feet pale fulvous gray; tail heavily haired throughout, basal three-fifths black, terminal two-fifths pure white.

Measurements.—Type (and only specimen), total length, 457 mm.; tail vertebræ, 267; hind foot, without claws, 35, with claws, 40; ear, 12. (Foot and ear measured from dry skin.)

Skull, total length, 52.5; basal length, 40; zygomatic width, 24.5; mastoid width, 21; interorbital width, 24; length of nasals, 15; width of nasals at middle, 5; crown length of upper toothrow, 5.8; palatal length, 5.3; length of lower toothrow, 5.3.

This very interesting species is based on a single specimen from Onaca. The pelage is very soft and full, the tail heavily

clothed, black for the greater part of its length and pure white for the terminal two-fifths. The ears are very small, tufted with long hairs on the inner surface; hind feet very short and broad. The skull is short and broad, the zygoma heavy and broad but not arched laterally, and the supraorbital edges of the skull are greatly developed, with straight external borders, the interorbital region being thus very broad with nearly parallel edges. The facial portion of the skull is extremely short, the distance between the incisors and the molar series being a little less than the length of the crown surface of the upper toothrow. The teeth are much worn, but indicate a tooth pattern closely like that figured by Günther for his *Lasiuromys villosus* (Deville), with which the general character of the skull agrees (*cf.* P. Z. S., 1876, 744, fig. 5). *Isothrix rufodorsalis*, however, appears on the whole to be very distinct from any of the other described members of the *Isothrix* group.

***Echimys mincæ*, sp. nov.**

Type, No. 15389, ♂ ad., Minca, Santa Marta District, Colombia, July 19, 1899; Coll. H. H. Smith.

General color above strong golden brown, lined with black, the pelage of the dorsal area consisting of yellowish brown hairs abundantly intermixed with grooved, black-tipped spines, which appear at the surface as blackish points; sides lighter and less varied with black, the yellowish brown hairs composing most of the pelage, with a few black-tipped bristly hairs intermixed; beneath, pure white, including inside of limbs, the pelage rather soft and wholly without spines; sides of the head lighter and more grayish than the sides of the body; top of head darker than the back, being more mixed with blackish; outer surface of the fore limbs gray tinged with yellowish, becoming whitish on the upper surface of the feet; hind limbs externally like the sides of the body, but upper surface of the feet whitish, varying from grayish white to nearly pure white; ears of medium size, oval, rounded at top, and covered externally with very fine short hairs, more sparsely clothed within; tail sharply bicolor, blackish above, nearly white below, clothed for an inch at the base with soft hairs like those of the adjoining parts of the body, the rest of the tail sparsely covered with very short hairs, imperfectly concealing the annulations.

Young in first pelage, uniform blackish brown above, pure white below. The pelage of the median area of the back is stiff and bristly, the spines in part grooved, but thinner and weaker than in the adult pelage.

Measurements.—*Type*, total length, 456 mm.; tail vertebræ, 210; hind foot, without claws, 50, with claws, 57. Twenty adult males and 14 adult females measure as follows: 20 males, total length, 437 (400-490); tail vertebræ, 202 (186-224); hind foot (with claws), 51 (46-57); 14 females, total length, 413 (380-440); tail vertebræ, 194 (170-210); hind foot (with claws), 46 (42-50).

Skull (of type), total length, 60; basal length, 47; zygomatic width, 27; mastoid width, 21; interorbital width, 13; length of nasals, 23; width of nasals at middle, 6.3; crown length of upper toothrow, 8.5; palatal length, 8.5; length of lower toothrow, 9.2.

This species is based on 102 specimens, of which 87 were taken at Minca and 15 at Bonda; the series includes quite a number of young of various ages, ranging from those in first pelage to young adults.

Echimys mincæ belongs to the same group as *E. trinitatis*, having the same pure white belly, the same general proportions, and practically the same dentition. It is, however, very much smaller and very different in coloration, being golden brown above instead of dark chestnut brown.

Echimys urichi, sp. nov.

Type, No. 14798, ♂ ad., Quebrada Secca, Venezuela, Nov. 23, 1898; F. W. Urich.

Similar in color and proportions to *E. trinitatis*, but much smaller.

Measurements.—Type, total length, 370 mm.; tail vertebræ, 171; hind foot, 43, with claws, 46; ear, 25. Ten adult males measure as follows: total length, 390 (344-409); tail vertebræ, 162 (140-186); hind foot, 44 (42-46); ear, 25 (24-27). Two adult females average slightly less.

Skull, type, total length, 48; basal length, 33; zygomatic width, 23; mastoid width, 20; interorbital width, 10.3; length of nasals, 16; width of nasals at middle, 4.5; crown length of upper toothrow, 8; palatal length, 8; length of lower toothrow, 8.6.

Named in honor of Mr. F. W. Urich, so well known through his natural history work in Venezuela and Trinidad.

This is an almost exact miniature of *E. trinitatis*, but the difference in size is so great that the separation seems unquestionably necessary, *E. urichi* being nearly one third smaller than *E. trinitatis*. The comparative measurements of *E. trinitatis*, *E. mincæ*, and *E. urichi* are shown in the following table, based on adult male specimens, from which it appears that the largest specimens of *E. urichi* do not very closely approach even the smallest specimens of *E. trinitatis*.

	No. of Specimens.	Total Length.	Tail Vertebræ.	Hind Foot.	Ear.
<i>E. trinitatis</i>	10	469 (440-510)	211 (185-230)	53.3 (51-55)	27 (21-31)
<i>E. mincæ</i>	20	437 (400-490)	202 (186-224)	51 (46-57)	
<i>E. urichi</i>	10	390 (344-409)	162 (140-186)	44 (42-46)	25 (24-27)

In *E. urichi* the spines are weaker than in *E. trinitatis*, and are confined to a much narrower tract of the median dorsal area.

E. urichi is based on a series of 21 specimens collected at Los Palmales and Quebrada Secca, near the northern coast of Venezuela, 90 miles south of Cumana, at elevations of 2000 to 4000 feet, in November and December, 1898. About one half the specimens are fully adult, and the remainder 'young adults,' there being no very young specimens in the series.

Echimys canicollis, sp. nov.

Type, No. 15397, ♂ ad., Bonda, Santa Marta District, Colombia, April 20, 1899; Coll. H. H. Smith.

Pelage of the dorsal region hispid, sparsely intermixed with weak slightly grooved spines; pelage of the sides and underparts softer but hairy and not furry. Color of the upper parts, from the nape posteriorly to the rump, rather pale yellowish brown, or pale golden brown, varied over the back with black-tipped spines or spiny hairs, paler and grayer on the sides, including the region at the base of the tail; top of head and nape grayish, varied with black; sides of head and sides of neck rather clear gray, becoming paler on the cheeks; lower parts and inside of limbs white, the gray of the sides of the neck extending on to the sides of the throat, and sometimes (especially in immature specimens) meeting to form a brownish gray throat band; upper surface of fore and hind feet gray, often approaching whitish on the hind feet; ears rather broad and low, brown, practically naked (short, grayish hairs are visible under a lens); tail rather indistinctly bicolor, blackish above, the lower surface (about one third of the circumference) dull flesh-color; the tail is scantily haired, the hairs partly (in some specimens wholly) concealing the annulations.

The young in first pelage are dusky gray above, the hairs faintly tipped with yellowish, darker along the middle of the back, grayer on the sides; below white, with sometimes a broad pectoral band of gray.

Measurements.—Type, total length, 425 mm.; tail vertebræ, 178; hind foot, 43, with claws, 50. Seventeen adult males and 18 adult females present the following measurements: 17 males, total length, 396 (372–440); tail vertebræ, 162 (155–185); hind foot (with claws), 50.5; 18 females, total length, 366 (352–408); tail vertebræ, 154 (134–175); hind foot, 47 (45–50).

Skull (of type), total length, 54; basal length, 38; zygomatic width, 25; mastoid width, 20.3; interorbital width, 12; length of nasals, 20; width of nasals at middle, 6; crown length of upper tooththrow, 8; palatal length, 9; length of lower tooththrow, 9.

This species is based on a series of 90 specimens, of which 45 are from Bonda, and the remainder about equally from Santa Marta, Mamatoca, and other nearby points, ranging in altitude

from sea level to 500 feet. As usual in doubtless all the species of *Echimys*, about one in four to six, in the adults, is tailless.

In coloration *Echimys canicollis* appears to greatly resemble *Louchehes caniceps* Günther (P. Z. S., 1876, 745), from Medellín, but here the resemblance ceases, the two forms being not even congeneric.

It is very different in color from either of the three other species mentioned in the present paper, and differs likewise in cranial characters. In dentition it is quite similar to *E. trinitatis*, *E. minca*, and *E. urichi*, but the skull is relatively shorter and broader, the audital bullæ are very much larger, and the pterygoids much slenderer and very differently shaped, while the basioccipital region is greatly narrowed, in consequence of the unusual size of the audital bullæ. It seems not to need comparison with any of the other described species of the genus.

Heteromys jesupi, sp. nov.

Type, No. 15347, near Minca (at an alt. of 1000 ft.), Santa Marta District, Colombia, July 30, 1899; Coll. H. H. Smith.

Slightly larger than *Heteromys anomalus* of Trinidad, and much paler. General color above grayish brown slightly varied with yellowish; beneath pure white, including the inner surface of the limbs, the white extending well up on the sides and running forward along edge of the cheek pouches to the nose, as in the allied forms, *H. anomalus*, *H. melanoleucus*, and *H. longicaudatus*; upper surface of hind feet dull white; of fore feet grayish white; forearm grayish brown, instead of blackish brown, as in the other forms; tail and ears scantily haired. Mammæ, $\frac{1}{2} + \frac{2}{2} = 6$,—two pectoral and four inguinal. Soles naked, 6-tuberculate.

Measurements.—*Type*, total length, 330 mm.; tail vertebræ, 163; hind foot, 33; ear (in skin), 16.3.

Skull, total length, 31.5; basal length, 26; zygomatic width, 16; mastoid width, 16; interorbital width, 8.6; crown length of upper toothrow, 4.5; length of lower toothrow, 4.6.

Named in honor of Morris K. Jesup, President of the American Museum of Natural History, through whose liberality the Museum has been placed in possession of the extensive collection of Colombian mammals which forms the basis of the present paper.

Heteromys jesupi is based on a series of 13 specimens, from six different localities in the Santa Marta District, varying in elevation from sea level to 2000 feet, as follows: Bonda and Mamatoca,

each 1; Bonda 3; Masinga Veija (500 feet), 3; Minca, (1000-2000 feet), 5. It is readily distinguishable from either *H. anomalus* or *H. melanoleucus* by its decidedly paler coloration, which is even more strongly shown by the young in first pelage than in the adults. The young of *H. jesupi* is grayish brown; of *H. anomalus* blackish brown. The similarity in size between the three South American species is shown in the following table of measurements. It should be noted that measurements of *H. jesupi* are all from females, and should be compared with those of the females of the other two species. From this comparison it is evident that *H. jesupi* is rather larger than either *H. anomalus* or *H. melanoleucus*.

	No. of Speci.	Sex.	Total Length.	Tail Vertebrae.	Hind Foot.
<i>Heteromys anomalus</i>	7	♂	290 (273-307)	160 (146-178)	35 (33-37)
“ “	14	♀	277.5 (265-290)	151 (132-160)	34 (33-36)
“ <i>melanoleucus</i>	11	♂	281 (276-309)	164 (151-180)	34.3 (33-36)
“ “	15	♀	264 (246-287)	149 (136-167)	34 (30-35)
“ <i>jesupi</i>	6	♀	292 (272-330)	160 (146-185)	34 (30-36)

NOTE ON *Heteromys melanoleucus* GRAY.—The small collection of mammals recently received from Mr. F. W. Urich, of Port-of-Spain, Trinidad, contained, among others of much interest, 31 specimens of *Heteromys melanoleucus* Gray (Proc. Zool. Soc. London, 1868, 204). Of these 23 were collected at Los Palmales, and the others at the nearby locality Quebrada Secca, in the mountains about 90 miles south of Cumana, at an altitude of about 3000 feet, in December, 1898.

Gray gave the habitat of his *H. melanoleucus* as “Honduras,” but, as shown by Mr. E. R. Alston, incorrectly, the specimen on which it was based having been sent by Dyson from Venezuela.¹ The exact locality of the specimen is not known, but is presumably near the coast in northern Venezuela.

As shown by the measurements given above, the external dimensions agree very closely with those of *H. anomalus* from Trinidad. There is practically also no difference in color, but the well made skins give the impression of a much stouter animal. This is well substantiated by the skulls, which are very

¹ Ann. and Mag. Nat. Hist. (5) VI, 1880, 118; Biol. Centr.-Am., Mamm., 167.

much larger, there being an average difference of about 3 mm. in total length, and very nearly a full millimetre in mastoid breadth. This difference is shown somewhat by the external measurements, inasmuch as the maximum size is greater in both sexes in *H. melanoleucus* than in *H. anomalus*. The skull is also not only larger in its linear dimensions, but is much more heavily built. The two forms, though closely related, are thus readily separable.

***Akodon venezuelensis*, sp. nov.**

Type, No. 14724, ♂ ad., Quebrada Secca, near Cumana, Venezuela. Collected Dec. 10, 1898, by Mr. F. W. Urich.

Color above yellowish brown with a slight olivaceous shade, varied with blackish, the hairs being plumbeous nearly their whole length, and tipped slightly with yellowish brown, producing a minutely grizzled effect, shading on olive; lower surface lighter, in general effect grayish washed with pale ochraceous, the color of the lower parts passing insensibly on the sides into the color of the upper surface; head concolor with the body; ears medium, dark brown, nearly naked on both surfaces; tail blackish above, grayish below, covered with very short hairs, through which the annulations are distinctly visible; feet dusky above, the soles of the hind feet black.

Measurements.—*Type*, total length, 161 mm.; tail vertebrae, 60; hind foot, 21.5, with claws, 24; ear, 16. The tail in this specimen is apparently abnormally short, due probably to injury in life, as in a series of five other specimens the tail ranges in length from 70 to 77 mm. A series of 6 specimens, 3 males and 3 females, all adult, measures as follows: Total length, 176 (166–189); tail vertebrae, 71 (60–77); hind foot (with claws), 22.3 (20–24); ear, 16 (15–17).

Skull, total length, 34.5; basal length, 23; zygomatic width, 19.6; mastoid width, 13; interorbital breadth, 6; length of nasals, 10; length of palatal foramina, 6.5; length of upper molar series, 5; length of lower jaw (condyle to tip of incisors), 20; height (coronoid to angle), 8.

Akodon venezuelensis is based on six specimens taken by Mr. F. W. Urich at Quebrada Secca, in the mountains 90 miles south of Cumana, Venezuela. They are all adult, and are very uniform in coloration and size. Compared with *A. urichi*, from Trinidad, it is smaller, with larger ears and a relatively longer tail, and is very strikingly different in coloration, the general color above being much paler and lacking the ruddy general effect seen in *A. urichi*.

***Akodon columbianus*, sp. nov.**

Type, No. 15336, ♂ ad., Manzanares (alt. 3000 ft.), Santa Marta District, Colombia, Sept. 6, 1899; Coll. H. H. Smith.

Above dark brown minutely grizzled with strong yellowish brown, varied

with black, with a tendency to a blackish median dorsal area; below uniform rusty brown, the rusty tips of the hairs often quite concealing the grayish under color; ears blackish, nearly naked; tail dusky, unicolor, entirely naked, the scanty very short hairs in no degree concealing the annulations; feet dusky (hind feet blackish), thinly haired.

Measurements.—Type, total length, 230 mm.; tail vertebræ, 102; hind foot, 27, without claws, 24.5; ear (in dry skin), 14. Four adult specimens (3 males and 1 female) measure as follows: Total length, 222 (207–230); tail vertebræ, 97 (94–102); hind foot, 26.5 (25–27).

Skull, total length, 30; basal length, 23; zygomatic width, 16, mastoid width, 13; interorbital width, 6.5; length of nasals, 7; length of palatal foramina, 4.6; length of upper toothrow, 4.8; length of lower jaw (condyle to tip of incisors), 17.5, height of lower jaw (coronoid to angle), 7.5.

Akodon columbianus differs from its nearest geographical ally, *A. venezuelensis*, by its much darker color, and very long, wholly naked tail, and by the unusual shortness of the rostral portion of the skull, and the corresponding shortness of the palatal foramina, which also terminate posteriorly considerably in advance of the first molar. While apparently as dark in color as *A. bogotensis*, it differs from that species in its larger size, very long tail, and in important cranial characters, the proportions of the skull being quite different, with the usual resulting differences in details.

This species is based on 4 specimens, 3 of which were taken at Manzanarès (altitude 3000 feet), September 6, 1899, and the other at Minca (altitude 2000 feet), July 17, 1899. They are all adult, and very uniform in coloration.

***Oryzomys maculiventer*, sp. nov.**

Type, No. 15306, ♂ ad., Sierra El Libano (alt. 6000 ft.), Santa Marta District, Colombia, May 17, 1899; Coll. H. H. Smith.

Pelage full, long, and soft. Color above tawny rufous varied with black-tipped hairs, brighter and clearer tawny on the sides; top of head darker and less tawny than the back, nose and sides of face to the eyes gray; beneath pure white, in adults the hairs are clear white to the base all over the ventral surface, which is sharply defined against the sides; forearm and manus pure white to above the elbow; hind limbs externally like the sides of the body, less rufous on the inner face; hind feet gray with a tinge of fulvous, especially proximally; ears rather large, brown, nearly naked on both surfaces except on the anterior base externally; tail naked, bicolor, brown above, flesh-color below.

Measurements.—Type, total length, 335 mm.; tail, 170; hind foot, 32 (without claws, 29); ear (in dry skin), 19. Twenty-eight adults, 18 males and 10

females, measure as follows: Males, total length, 329 (307-345); tail, 176 (162-194); hind foot, 32.7 (29-36). Females, total length, 312 (302-333); tail, 172 (163-182); hind foot, 32 (28-34).

Skull, type, total length, 34.4; basal length, 27; zygomatic width, 18; mastoid width, 13; interorbital width, 5; length of nasals, 7.6; palatal length, 7.8; length of palatine foramina, 5.5; length of upper toothrow, 5.5; length of lower jaw (condyle to incisor tips), 20; height (condyle to angle), 8.5; at coronoid process, 8.5.

Young in first pelage.—Above dark, many of the hairs rufous tipped; sides of the nose paler and more tinged with rufous; below dark gray, with irregular patches of white, the general color of the ventral surface passing gradually on the sides into that of the upper surface; ears, tail, and feet nearly as in the adult, except that the fore limbs are externally like the sides of the body. The ventral patches of white are variable in size and consist usually of a small anal patch and a very large pectoral patch, in which the hairs are white to the base, as in the adults.

From this early phase there is every gradation to the pelage of the adult. This change is most noteworthy and interesting in respect to the ventral surface, where the original white patches gradually extend till the whole ventral area becomes entirely pure white to the base of the hairs. Not only do the original white patches increase in extent, but white hairs also become intermixed with the gray of the general surface, so that the original gray becomes veiled with white long before the gray disappears from the basal portion of the pelage. In advanced stages of the change the pectoral patch extends forward to the throat, and backward along the median line of the belly, meeting the enlarging anal patch, at this stage only the lateral portions of the ventral surface remaining gray, more or less strongly veiled with white. The wholly pure white ventral surface seems to be acquired slowly, and may never be obtained by all individuals, as the percentage of such specimens is small in the present large series, being not over one in seven. The particolored condition of the majority of even the practically adult specimens has suggested the specific name here imposed.

Oryzomys maculiventer seems to be a common species in the Sierra El Libano district, the present series numbering 47 specimens, collected as follows: Valparaiso, altitude 4500 feet, 13 specimens, April 14-June 16, 1899; Sierra El Libano, elevation 6000 feet, 34 specimens, May, 1899.

This is one of the largest members of the genus known to me, being considerably larger than any species thus far described from northeastern South America. In cranial characters it resembles *O. meridenensis* Thomas, from Merida, Venezuela, and it seems also related to *O. albigularis* (Tomes), from Pallatanga, Ecuador, but is much larger than either, and apparently differs

in coloration. A peculiar feature of the skull is the shortness of the palatine foramina.

***Oryzomys trichurus*, sp. nov.**

Type, No. 15328, ♂ ad., El Libano plantation, near Bonda (alt. 500 ft.), Santa Marta District, June 29, 1899; Coll. H. H. Smith.

Pelage ordinary. Color above strong yellowish brown, approaching ochraceous, conspicuously lined with black; sides, and especially the sides of the face, ochraceous; below uniform pure white to the base of the fur; ears rather small, brown, well covered externally with short yellowish brown hairs; tail considerably longer than head and body, heavily clothed with pale yellowish brown bristly hairs, completely concealing the annulations; fore feet whitish, hind feet yellowish buff.

Young in first pelage are yellowish gray-brown above, rather clearer fulvous on the cheeks and sides, and pure white below to the roots of the hairs, as in the adult. Tail hairy.

Measurements.—Type, total length, 281 mm.; tail vertebræ, 160; hind foot, 23, with claws, 25; ear (in dry skin), 13.

Skull, total length, 30; basal length, 22; zygomatic width, 15; mastoid width, 11; interorbital width, 5; length of nasals, 10.5; palatal length, 5.3; palatine foramina, 5; upper toothrow, 4; lower jaw, length (condyle to incisor tips), 18; height (condyle to angle), 6.7; height at coronoid, 6.5.

Oryzomys trichurus is based on an adult male and two young (as skins, other young in alcohol), all from near Bonda. An adult nursing female, also from Bonda, resembles the type in measurements and coloration, and is indistinguishable also in cranial characters, but has the tail nearly naked, possibly from the wearing off of the hair.

This species is at once recognizable by its heavily clothed tail, pure white underparts, and strong fulvous coloration above. It evidently belongs to the *O. flavicans* group, from which it differs in its heavily clothed tail and pure white underparts. The tail is as hairy as in *Rhipodomys sumichrasti*. *O. flavicans illectus* Bangs, from Pueblo Viejo, Colombia, from an altitude of 8000 feet (*O. trichurus* is from near sea level), is similar in most respects, but has the underparts "a beautiful rich orange-buff to base of hairs." A specimen in the Smith collection from Minca, altitude 2000 feet, is apparently intermediate between *illectus* and *trichurus*, it having larger ears than *trichurus*, and being much deeper colored above, with an orange ochraceous lateral band, the lower parts strongly tinged with ochraceous, and the tail naked. This

specimen I refer provisionally to *O. f. illectus*, though evidently it is not typical.

In notes on the labels the collector states that in one case the young specimens were found in a nest in a hollow tree, and in the other in a bird's nest.

Oryzomys sanctæmartæ, sp. nov.

Type, No. 15312, ♀ ad., Bonda, Santa Marta District, Colombia, June 5, 1899; Coll. H. H. Smith.

Pelage full, long, and rather coarse. Color above pale yellowish brown, lined with black, through the admixture of many black-tipped hairs; sides, including cheeks, paler and grayer; ventral surface entirely clear whitish gray, the fur plumbeous at base; ears rather small, pale brown, nearly naked; tail short, indistinctly bicolor, blackish brown above, a little lighter (in some specimens fulvous gray) below, nearly naked, except apically, where the short hairs are more numerous and longer; feet grayish flesh-color; hind feet stout and broad, the lateral toes relatively rather shorter than usual in species of *Oryzomys*.

Measurements.—Type, total length, 229 mm.; tail vertebræ, 100; hind foot, 24.5 (with claws, 27); ear (in dry skin), 15.

Skull, total length, 31; basal length, 24; zygomatic width, 16; mastoid width, 12; interorbital width, 5; length of nasals, 13; palatal length, 5.2; length of palatine foramina, 6.2; length of upper toothrow, 4.4; length of lower jaw (condyle to incisor tips), 20; height at condyle, 7; height at coronoid, 8.

Oryzomys sanctæmartæ is based on 8 fully adult specimens—5 males and 3 females—collected in the low coast district (sea level to 500 feet) near Santa Marta (Santa Marta, 1 specimen; Bonda, 4; Mamatoca, 2; Masinga Veija, 1), April 15 to June 12, 1899. They are very uniform in coloration; a single 'young adult' female differs from the others in being somewhat darker above.

This form belongs to the same short-tailed group of the genus as *O. brevicauda* Allen & Chapman, from Trinidad, and *O. phæopus* and *O. phæopus obscurior* Thomas, respectively from Pallatanga, Ecuador, and Concordia, Medellin, Colombia, all these localities being in very different faunal areas from that about Santa Marta. It is, however, much smaller than *O. brevicauda*, and very different in coloration, the pale yellowish-brown of the upper parts of *O. sanctæmartæ* contrasting strongly with the rufous brown of *O. brevicauda*. On the other hand, *O. sanctæmartæ* is evidently

very much paler than *O. phæopus*, which is described as nearly agreeing in the color of the upper parts with the "vandyke-brown" of Ridgway's 'Nomenclature of Colors,' and as "dirty-buff" below; while *O. sanctæmartæ* agrees, above, quite nearly with Ridgway's "tawny-olive," and is clear light-gray below. It is also rather larger than *O. phæopus*, while *O. phæopus obscurior* is described as still smaller and darker than *O. phæopus*. The following table shows the comparative measurements of these four forms.

	No. of Spec. and Sex.	Total Length.	Tail Vertebrae.	Hind Foot.
<i>O. sanctæmartæ</i>	5 ♂	230 (216-241)	97.6 (90-103)	26.5 (25-29)
"	3 ♀	220 (210-235)	92 (85-100)	25.7 (23-27)
<i>O. brevicauda</i>	13 ♂	253 (230-272)	103 (83-115)	28 (26-30)
"	5 ♀	233 (220-238)	89 (88-93)	27 (25-30)
<i>O. phæopus</i>	1	210	98	24 (without claw)
<i>O. p. obscurior</i>	1	200?	89? (tail defective)	22.4 (without claw)

Oryzomys mollipilosus, sp. nov.

Type, No. 15323, ♀ ad., Valparaiso (alt. 4500 ft.), Santa Marta District, May 10, 1899; Coll. H. H. Smith, "Mother of four young"—collector's note on label.

Pelage soft and velvety, especially soft and downy on the ventral surface. Color above, yellowish gray-brown, strongly varied with black-tipped hairs, tending to a blackish median dorsal area; sides paler, gray-brown faintly tinged with pale buff; below clear uniform ashy gray, the basal half of the hairs pale plumbeous; ears medium, blackish brown, almost naked; tail dark brown above, a little paler below, very finely scaled and nearly naked; feet flesh color.

The young in first pelage are blackish brown, the hairs, more especially on the sides, slightly tipped with pale yellowish-brown; lower parts as in adult.

Measurements.—Type, total length, 233 mm.; tail, 110; hind foot, 25.5, with claw, 28; ear (in dry skin), 14. A series of 3 adults measures as follows: Total length, 330 (225-333); tail, 110 (108-113); hind foot, 29 (27-30).

Skull, total length, 30; basal length, 21.5; zygomatic width, 14; mastoid width, 12; interorbital width, 5; length of nasals, 10; palatal length, 6; length of palatal foramina, 3.8; length of upper toothrow, 4.3; length of lower jaw, 18; height at condyle, 7; height at coronoid, 6.5; length of lower toothrow, 4.5. Supraorbital bead well developed.

Oryzomys mollipilosus is based on four adults and three young,

all from Valparaiso (altitude 4500 feet), except one, which is from Minca (altitude 2000 feet). The adults vary a little in the amount of black intermixture in the dorsal area, the Minca specimens, referred here doubtfully, having quite a distinct median blackish area.

This species appears to be related to *O. gracilis* Thomas, from Concordia, Medellin, Colombia, resembling it in proportions, in its soft velvety pelage, and in the general coloration of the upper parts. It is, however, not white on the under surface, and is very much larger. It also greatly resembles *O. magdalenæ* of the present paper, but is much paler above, and also very much larger. That the specimens of *O. mollipilosus* are adult is evinced by the fact that two of the females were nursing young.

Oryzomys magdalenæ, sp. nov.

Type, No. 15318, ♀ ad., Minca (alt. 2000 ft.), Santa Marta District of Magdalena Province, Colombia, August 3, 1899; Coll. H. H. Smith.

Pelage, short, very soft, and velvety. Above strong yellowish brown, much varied with black, especially along the median area, paler, uniform yellowish brown on the sides; below uniform whitish gray, the hairs plumbeous at base, and the pelage very thick, short, and velvety; ears blackish brown, of medium size, naked; tail brown, scarcely lighter below, naked, very finely scaled; feet flesh color.

Measurements.—Type, total length, 244 mm.; tail, 144; hind foot, 33; ear (in dry skin), 15. Another specimen, ♂ ad., from Valparaiso, measures as follows: Total length, 234; tail, 135; hind foot, 29, with claws, 32.

Skull, total length, 31.5; basal length, 25; zygomatic width, 15; mastoid width, 12.2; interorbital width, 5.3; length of nasals, 12; palatal length, 7; length of palatal foramina, 3.4; length of upper toothrow, 4.3; length of lower jaw, 19.2; height at condyle, 7; height at coronoid, 7; length of lower toothrow, 4.8.

Oryzomys magdalenæ is based on two specimens, one of which, a female, is from Minca and the other, a male, from Valparaiso.

This species belongs to the same group as *Oryzomys gracilis* Thomas, and *O. mollipilosus* of the present paper, and perhaps *O. velutinus* Allen & Chapman from Trinidad. The latter, however, is larger and much redder, and has much larger ears. *O. mollipilosus* is, as regards general features, a miniature of *O. magdalenæ*, but is paler, as well as much smaller, and has a relatively much shorter tail.

***Oryzomys villosus*, sp. nov.**

Type, No. 15321, ♀ ad., Valparaiso (alt. 4500 ft.), Santa Marta District, Colombia, April 15, 1899; Coll. H. H. Smith.

Pelage soft, fine, and velvety throughout. Color above yellowish brown, mixed with black, paler and more yellowish on the sides; below uniform whitish gray, fur plumbeous at base; ears light brown, large, naked; tail long, brown, a little lighter below than above, more especially on the proximal half; feet buffy gray.

Measurements.—Type, and only specimen: total length, 275 mm.; tail, 148; hind foot, 26, with claws, 28.5; ear (in dry skin), 17.

Skull, total length, 32.6; basal length, 26; zygomatic width, 17.5; mastoid width, 12.4; interorbital width, 5.5; length of nasals, 11; palatal length, 7; length of palatal foramina, 5; length of upper toothrow, 5.4; length of lower jaw (condyle to incisor tips), 21; height, condyle to angle, 8.3; height at coronoid, 8; length of lower toothrow, 6. Skull short, broad, especially the rostral portion; coronoid low, broad, angular, without the usual prominent backwardly directed point.

Oryzomys villosus is based on a single adult nursing female, from Valparaiso. Apparently only four mammae were functionally developed, of which one pair is inguinal and one pair axillar. This is a long-tailed, rather large species, with rather large ears and a remarkably soft, short, velvety pelage throughout. (The pelage, however, seems rather worn.) The skull is short, broad, and massive, with the coronoid very low and broad, forming merely an obtuse angle without a sharp point; yet the two sides are alike and the structure seems normal. It is apparently nearly related to *O. meridensis* Thomas, but is smaller, with a relatively longer tail, very much smaller ears, and a quite different coloration. It is perhaps still nearer *O. vestitus* Thomas, also from Merida, from which its smaller size and dissimilar coloration should distinguish it.

***Oryzomys palmarius*, sp. nov.**

Type, No. 14733, ♂ ad., Quebrada Secca, Venezuela, Dec. 10, 1898; F. W. Urich.

Pelage full, long, and soft. Color above yellowish gray-brown, varied with blackish-tipped hairs, passing into pale fawn on the sides; head and face much grayer than the body; below dull grayish white, the plumbeous underfur well concealed by the whitish tips; ears of medium size, brown, thinly-haired; forearm and manus dingy gray, the toes lighter, whitish; hind foot short for the size of the animal, thinly haired, varying in different specimens from dingy

gray to flesh color; tail long, dark brown, nearly unicolor, naked except towards the tip, where it is scantily clothed but not penicillate.

Measurements.—Type, total length, 269 mm.; head and body, 119; tail vertebrae, 150; hind foot, 21.5, with claws, 24; ear, 19. Four adults measure as follows: Total length, 260 (238–281); tail vertebrae, 146 (135–162); hind foot, 25 (24–26); ear, 17 (16–19).

Skull (of type), total length, 31; basal length, 24; zygomatic width, 16.6; mastoid width, 12.4; interorbital width, 5.3; nasals, 11; palatal length, 7.2; palatal foramina, 6.5; upper toothrow, 5; lower jaw, length (condyle to incisor tips), 20; height, angle to condyle, 7.8.

Oryzomys palmarius is based on five adult specimens, four of which are from Quebrada Secca, and one from Los Palmales, taken Nov. 26 to Dec. 10, 1898, by Mr. F. W. Urich. One, a young adult, differs a little from the others in being darker and less fulvous.

This species is a very near ally of *Oryzomys trinitatis* Allen & Chapman, from Trinidad. It differs from it in being decidedly smaller and paler, and in having a grayer head and face. In proportions, in the texture of the pelage, and in cranial characters (except in the much smaller size of the skull), there is a close similarity. The tail, however, is slightly villous, especially toward the tip, and not naked, as in *O. trinitatis*. It is very much smaller and otherwise very different from either *O. meridensis* Thomas, or *O. vestitus* Thomas, both from the vicinity of Merida.

***Oryzomys tenuicauda*, sp. nov.**

Type, No. 14737, ♂ ad., Los Palmales, Venezuela, Dec. 5, 1898; F. W. Urich.

Pelage long and soft. Ears of medium size. Color above dark fawn brown, shaded on the back with dusky, and passing into bright fulvous on the sides; below clear white, basal half of fur plumbeous; ears brown, slightly hairy; tail dark brown, unicolor, basal third nearly naked, middle portion well haired, the hairs increasing in length and thickness on the apical half, hiding the scales, and at the tip forming a thick pencil 10 mm. long; fore feet buff; hind feet short, the edges and toes buff, with a dusky median band to the base of the toes.

Measurements.—Type, total length, 216 mm.; head and body, 88; tail vertebrae, 128; hind foot, 20.5, with nails, 23; ear, 19.

Skull, total length, 27; basal length, 20.5; zygomatic width, 15; mastoid width, 11; interorbital width, 5; length of nasals, 8; palatal length, 4;

palatine foramina, 4.3; upper tooththrow, 4.3; lower jaw, length (condyle to incisor tips), 17.5; height, angle to condyle, 7.

This species is based on a single specimen, an adult male, from Los Palmales, Venezuela, but I refer to it provisionally, also, a young adult from Quebrada Secca.

In the texture of the pelage and in color *O. tenuicauda* is a miniature of *O. velutinus* from Trinidad; it is, however, somewhat paler, and the tail is proportionately fully one third longer, and hairy in the apical half instead of entirely naked; the hind foot is also relatively very much shorter. It seems to possess no very near ally among the described species of northeastern South America. The skull presents nothing peculiar.

***Oryzomys modestus*, sp. nov.**

Type, No. 14734, ♀ ad., Campo Alegre (alt. about 3000 ft.), Venezuela; F. W. Urich.

Pelage very soft and close, of moderate length. Above dark rufous brown, darkened with an abundance of black-tipped hairs; sides clearer deep rufous; below gray, the hairs whitish-tipped, plumbeous at base, which tint enters into the surface color; forearms gray, feet flesh color; hind feet flesh color, thinly-haired; ears large, dark brown, covered with very short dark brown hairs; tail blackish brown, unicolor, nearly naked, one fifth shorter than head and body.

Measurements.—*Type*, total length, 220 mm.; head and body, 120; tail, 100; hind foot, 25, with claws, 28; ear, 20.

Skull, type (imperfect at base), total length,—; basal length,—; zygomatic width, 16; interorbital width, 5; length of nasals, 12; palatal length, 7; palatal foramina, 5; upper tooththrow, 4.5; lower jaw, condyle to incisor tips, 19; angle to condyle, 7; lower tooththrow, 5. The skull presents the usual characters of the genus.

Oryzomys modestus is based on a single adult female from Campo Alegre, near Quebrada Secca, Venezuela. It appears to be very distinct from any previously described species. It differs from *O. tenuicauda* in its much larger ears, very much darker coloration, and very short tail, the tail being much shorter than the head and body instead of one third longer, as in *O. tenuicauda*.

***Oryzomys fulviventer*, sp. nov.**

Type, No. 14735, ♀ ad., Quebrada Secca, Venezuela, Nov. 23, 1898; F. W. Urich.

Pelage full, soft, and long. Color above dark fulvous brown, finely grizzled with black-tipped hairs; nose and frontal region darker than back, grayish fulvous strongly mixed with black; below strongly washed with fulvous, the pelage basally plumbeous; chin and throat whitish, the hairs white to the base; upper surface of feet dingy gray; ears medium, thinly haired, many of the hairs slightly tipped with fulvous; tail blackish, unicolor, nearly naked except apically, where it is thinly clothed and slightly penicillate.

Measurements.—Type, total length, 270 mm.; head and body, 131; tail vertebrae, 139; hind foot, 25, with claws, 27; ear, 19.

Skull, total length, 32; basal length, 25; zygomatic width, 17; mastoid width, 12.3; interorbital width, 5.1; length of nasals, 11; palate, 6; palatal foramina, 5.7; upper toothrow, 5; lower jaw, condyle to incisor tips, 20.3; angle to condyle, 9; lower toothrow, 5.6. Supraorbital bead strongly developed.

Oryzomys fulviventer is based on a single adult female, from Quebrada Secca, Venezuela (altitude about 3000 feet). Its fulvous underparts, combined with its size and proportions, distinguish it from any other species described from either Venezuela or Colombia. It is certainly not *O. flavicans* Thomas, from Merida. What its relations may be to forms from Guiana and Brazil I am unable to say, but, on the basis of geographical considerations, it is not likely to prove identical with any species from these faunally very different regions.

***Sciurus saltuensis bondæ*, subsp. nov.**

Sciurus variabilis BANGS, Proc. Biol. Soc. Washington, XI, 1898, 184. (Not of I. Geoffroy.)

Type, No. 15234, ♀ ad., Bonda, Santa Marta District, Colombia, July 4, 1899; Coll. H. H. Smith.

Winter or Breeding Pelage.—General color (in the type) of the upper parts, limbs externally, and the tail, deep red; ventral surface, including the inner side of the fore limbs nearly to the wrist and of the hind limbs nearly to the ankle, pure white; sides of the head below the eyes, mouth parts, and throat, fulvous; top of the head, superficially red like the back, but with most of the hairs subapically annulated with black, giving a slight dingy cast in contrast with the body; also the hairs of the lower back and base of the tail are annulated below the surface with black; tail hairs entirely deep red from base to tip, without trace of black annulations. In other specimens the tail hairs are narrowly, or in some cases broadly, banded with black.

Summer or Post-breeding Pelage.—General color above yellowish red varied with black, resulting in a general olivaceous effect, the hairs individually being annulated near the tips with yellowish red and black; ventral surface and the tail as in the winter pelage. The fore limbs, a narrow lateral line, the inner

edge of the thighs, and the hind feet usually clear yellowish red, but frequently the front surface of the forearm and the proximal half of the hind feet show annulated hairs.

Young.—Young specimens in first pelage are usually yellowish red to dark red (the tail varying greatly in different specimens), the hairs individually annulated more or less strongly with black, thus resembling in a general way the post-breeding pelage of the adults.

Measurements.—Type, total length, 474 mm.; tail vertebræ, 230; hind foot, without claws, 50, with claws, 55. Adult breeding males and females from Bonda measure as follows: 13 males, total length, 472 (439–520); tail vertebræ, 227 (205–255); 16 females, total length, 477 (448–500); tail vertebræ, 223 (215–250).

Skull.—Premolars, $\frac{1}{4}$. Total length, 56; basal length, 42; zygomatic width, 31; postorbital width, 19; upper toothrow, 9.2; lower jaw (condyle to incisor tips), 32; height, angle to condyle, 20.

This variable species is represented by a series of 54 specimens, of which 50 were collected at Bonda (near sea level) and 4 at Minca (alt. 2000 ft.). The Minca specimens were taken July 24 to August 1; 36 of the Bonda specimens were taken in July, 5 in June, 4 in August (Aug. 2 and 3), 1 in each of the months May, April, and March, and 2 in November. The material is therefore insufficient to show satisfactorily the variations of color and character of pelage incident to season. The very large series of July specimens, however, shows various conditions of pelage, and indicates that a large part of the color variation is due to change of pelage by molt, while there is also evidently a wide range of individual variation.

In general terms, the July specimens vary from nearly uniform bright red (the pure white ventral surface of course always excepted) to a nearly uniform olivaceous effect (the limbs excepted, which are always red), due to a minute mixture of yellowish red and black, the individual hairs of the upper surface being yellowish red or red (the shade varying in different specimens from light to dark red), broadly annulated near the tip with black. Between these extremes there is every intermediate stage. A very common intermediate stage has a narrow band of red bordering the white of the ventral surface, which broadens upward at the shoulders, and often meets on the back.

On comparing the two extremes a marked difference in the character of the pelage in the two phases is strikingly evident. In the wholly red phase the coat is longer than in the olivaceous

phase, and the individual hairs of the dorsal region are lustrous red, entirely lacking the black annulations. In the next stage the long red hairs form a broad mantle, covering the shoulders and extending along the sides, while the head and back are mixed red and black, the hairs over these portions being shorter and conspicuously annulated with black. In the extreme olivaceous phase the pelage is much shorter, and the whole dorsal surface is covered with annulated red and black hairs, while the feet, the forearms, outer edge of the thighs, and a narrow line bordering the white of the ventral surface are red. About ten of the specimens are distinctly in the clear red phase, and about the same number are in the annulated olivaceous phase, the remaining one half to two thirds being in various stages of transition between the two. In all of these the color of the dorsal surface extends for a short distance on to the base of the tail; in the wholly red specimens the basal portion of the tail is red, like the back.

The individual variation consists mainly in intensity of the red of the general pelage; this varying from light yellowish red to dark or chestnut red. The tail is exceedingly variable in respect to the amount of black near the base of the hairs. The greater part of the specimens, irrespective of variations in the color of the body, have all the tail hairs entirely red to the base; in others a portion of the hairs are broadly annulated with black near the base, the number of these hairs and the width of the black band increasing from the base of the tail toward the tip. This development of black in the tail varies, in specimens where black is present, from a faint trace, most pronounced on the outer third of the tail, to a conspicuous broad band, visible at the surface without parting the hairs, or at least producing a clouded effect near the tip. As thus developed the black forms a broad concealed subbasal zone, occupying from one fifth to one third the length of the hairs, which are red at base and tip, the overlying hairs on both surfaces of the tail being intense deep red.

Individual variation in color is also well shown in a series of 6 one-fourth to one-third grown young. One of these was taken in June, four in July (July 7-14), and one Nov. 18. The June and July specimens resemble the red phase of the adults, while the November specimen resembles the mixed red and black phase.

The extent of white upon the inner surface of the limbs varies greatly, particularly on the hind limbs, where it is sometimes almost absent and sometimes extends nearly to the ankle.

The seasonal and also the individual variation is closely parallel to that of the *Sciurus hudsonicus* group of North America. The present series shows unmistakably two distinct pelages, but the seasonal change in color due to molt must extend over a considerable period. The June and July specimens present nearly every state of change. Also, as in *Sciurus hudsonicus*, not all of the specimens acquire the full red stage on completion of the post-breeding pelage, this condition, as in *S. hudsonicus*, being probably more or less influenced by the age of the individual.

The type locality of *Sciurus variabilis* has been currently considered to be Colombia, from Geoffroy's statement,¹ that the species was based on "trois individus envoyés au Muséum d'histoire naturelle par M. Plée, et sur lesquels je ne puis donner aucun renseignement, si ce n'est qu'ils venaient d'Amérique"; and further, that "plusieurs de ces objets [sent by M. Plée] appartenaient à la Colombie, plusieurs aux Antilles et quelques-uns aux Etats-Unis." Obviously the squirrels sent by M. Plée, forming the basis of *S. variabilis* Geoffroy, could not have come from either the Antilles or the United States. On the other hand, neither his description nor his figure agrees very well with any of the Colombian specimens in the present large series. He says, "le pelage est en dessus d'un noir tiqueté de roux ou d'un roux tiqueté de noir. La même remarque est applicable aux longs poils de la queue toujours noir à leur origine et roux à leur extrémité. Mais il résulte de la disposition distique de la queue qu'elle est toujours beaucoup plus noire à la face postérieure qu'à l'antérieure." The colored plate indicates the median area of the upper parts to be very dark from the nose to a little behind the middle of the back where the color changes abruptly to deep red over the posterior third of the dorsal region. The tail is represented as blackish for two thirds of its length from the base, the rest reddish, becoming yellowish at the tip. While the color of the anterior two thirds of the dorsal surface might agree well enough with specimens in the mixed red and black phase, the

¹ Guérin's *Magasin de Zoologie*, II, 1832, Classe I, pl. iv and accompanying (unpaged) text.



color of the posterior third of the back and the tail are wholly unlike any specimen in my series of upwards of fifty examples.

The description and figure, on the other hand, agree much better with the dark mountain form recently named *Sciurus variabilis saltuensis* by Mr. Bangs, especially in the dark upper parts and in the darkness of the basal portion of the tail, but the red lower back and rump are still discordant; and it is not probable, though possible, that M. Plée's specimens came from so far in the interior. They are much more likely to have come from western Colombia than from the coast district about Santa Marta.

***Sciurus (Guerlinguetus) æstuans quebradensis*, subsp. nov.**

Type, No. 14725, ♀ ad., Quebrada Secca, Venezuela, Dec. 2, 1898; F. W. Urich.

Color above finely punctated pale yellow and black, giving a pale olivaceous gray general effect, nearly uniform throughout the whole dorsal aspect, including the basal portion of the tail and the limbs externally; cheeks and nose grayer; eye-ring and upper surface of feet more strongly yellowish; ventral surface orange-buff, the inside of the limbs paler, and the chin and throat still paler, or buffy gray; ears externally like the back, but with the hair tips a little more rufous; tail above grizzled with black and pale fulvous, broadly edged for the terminal two thirds with deep orange, in some specimens deep reddish orange; below similar but rather paler; the tail pattern below consists of three narrow bands of black, two of fulvous and an outer broad band of red as follows: a narrow basal band of black, followed by a narrow band of pale fulvous, a second narrow band of black, a second narrow band of rather deeper fulvous, a third broader band of black, and a very broad edging of orange rufous.

Measurements.—Type, head and body, 192 mm.; tail vertebræ, 156; total length, 348; hind foot, 46, with claws, 51; ear, 22. Three specimens, including the type, measure as follows: Total length, 345; tail vertebræ, 160; hind foot, 44.5, with claws, 50; ear, 22.

Skull, total length, 47; basal length, 35.5; zygomatic width, 27; mastoid width, 20; postorbital width, 18; length of nasals, 15; width of nasals at base, 5, in front, 6.

Sciurus æstuans quebradensis is based on three adult specimens, —two males and one female,—two of which are from Quebrada Secca, and the other from Los Palmales. They differ in color only in the tail, the outer red border of which is somewhat lighter in one specimen than in the others.

This form differs from *S. æstuans* (type locality, Surinam) in having all the tints very much stronger throughout. It differs also from its nearest geographical ally, *S. chapmani* from Trinidad, in being much lighter colored and less ruddy throughout, and consequently still more from *S. hoffmanni*.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs' forms a separate and complete monograph, varying in size from 24 to 100 or more pages, with numerous plates, mostly lithographic. The Parts of the 'Memoirs' thus far issued are as follows:

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coala Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VII, 1895.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" VIII, 1896.....	" 4.00
" III, 1890-91.....	" 4.00	" IX, 1897.....	" 4.75
" IV, 1892.....	" 4.00	" X, 1898.....	" 4.75
" V, 1893.....	" 4.00	" XI, Part I, 1898	" 1.25
" VI, 1894.....	" 4.00	" " " II, 1899	" 2.00

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; and R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

*The Generic Names Echimys and
Loncheres.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XII, ARTICLE XX, pp. 257-264.

New York, December 26, 1899.

The Knickerbocker Press, New York

Article XX.—THE GENERIC NAMES *ECHIMYS* AND *LONCHERES*.

By J. A. ALLEN.

The generic names *Echimys* and *Loncheres* have a rather involved history. The genus *Echimys* was first named by Étienne Geoffroy Saint-Hilaire, in a work written in "1808 ou 1809," but never published, as we learn from his son Isidore.¹ The name *Echimys* was first published in an abstract of a paper by F. Cuvier, on the dental characters of mammals, in 1809,² the entire reference to *Echimys* being as follows: "Dans l'ordre des rongeurs, pour ne parler que des genres, l'auteur établit les suivans, en réunissant les dents semblables, ou en séparant celles qui diffèrent; 1.° avec M. Geoffroy, celui des *Echimys* formé du lerot à queue dorée et du rat épineux de d'Azara."

In 1812, F. Cuvier, in the third part of his 'Essai sur de nouveaux Caractères pour les genres des Mammifères,' treated the genus *Echimys* at length,³ describing and figuring the dentition of the only two species mentioned by him as belonging to this genus, namely, 'le rat épineux'⁴ (pl. xv, fig. 14) and 'le rat à queue dorée'⁵ (pl. xv, fig. 15),—the same species originally referred by him to *Echimys*. His description and figures show clearly, however, that the two species are not congeneric, as genera are now recognized, and it becomes necessary to fix upon one of them as the type of *Echimys*.⁶

In 1825 F. Cuvier, in his 'Dents des Mammifères' (p. 185 and pl. lxxiii), again referred to the genus *Echimys* and figured the dentition of *E. dactylinus*. In his reference to the genus he

¹ Notice sur les Rongeurs épineux, désignés par les auteurs sous les noms d' *Echimys*, *Lonchere*, *Heteromys* et *Nelomys*, par M. Isidore Geoffroy Saint-Hilaire. Mag. de Zoologie, 2^e sér., 1840. Mammifères, pll. xx-xxix, pp. 1-57. Cf. pp. 1 and 2.

² Bull. Soc. philom., No. 24, Sept., 1809, p. 394.

³ Annales du Mus. d' Hist. Nat., XIX, 1812, pp. 283-285, pl. xv, figs. 14 and 15. This same plate, with these figures, is republished by G. Cuvier, in his 'Ossemens fossiles' (2d ed., V, pt. 1, 1823, pl. i), and his remarks respecting the osteological characters of "Les échimys" are doubtless based on the two species whose dentition is here figured. No particular species, however, is mentioned, beyond what is implied by the reference to the figures.

⁴ *Echimys spinosus* Desmarest (1817, ex E. Geoffroy, MS.).

⁵ *Echimys cristatus* Desmarest (1817, ex E. Geoffroy, MS.) = *Myoxus chrysurus* Zimmermann, 1780.

⁶ It appears from Desmarest (Nouv. Dict. d' Hist. Nat., nouvelle éd., X, 1817, pp. 54-59), and also from I. Geoffroy Saint-Hilaire (*l. c.*), that E. Geoffroy Saint-Hilaire, in his manuscript work (circa 1809), referred seven species of Spiny Rats to the genus *Echimys*. These were first published by Desmarest in 1817, under E. Geoffroy's manuscript names, Desmarest giving "Geof.," "Geoff.," "Geoffr.," or "Geoffroy" as the authority for the names in each

says: "C'est de l'echymys dactylin, jeune encore, de M. Geoffroy-Saint-Hilaire que j'ai tiré ce système de dentition" (p. 186). This species is also not congeneric with either of the two species referred by F. Cuvier to the genus *Echymys* in 1809 and 1812, and all three are now placed in separate genera. His 'echymys dactylin' became, in 1838, the type of *Dactylomys* I. Geoffroy, and in 1843, the type of Lund's genus *Echymys*; his 'rat épineux' is the type of *Loncheres* Illiger, 1811, and congeneric with the type of *Nelomys* Jourdan, 1838; and finally his 'rat à queue dorée' is congeneric with the type of *Mesomys* Wagner, 1845.

Two years after *Echymys* was introduced into the literature of zoölogy, namely, in 1811, Illiger proposed the genus *Loncheres*,⁸ on the basis of a formal but rather meaningless diagnosis, and the following: "Species: *Loncheres paleacea* (nova species e Brasilia) et *Hystrix chrysuros* LinGmel." As the first species here mentioned remained a *nomen nudum* till described by Lichtenstein in 1820, it cannot be taken as the type, under the A. O. U. Canon XLII, which provides that the basis of a generic or subgeneric name must be either "(1) a designated recognizably described species, or (2) a designated recognizable plate or figure, or (3) a published diagnosis." As *Loncheres paleacea* complies with none of these conditions, his "*Hystrix chrysuros* LinGmel." becomes the type of *Loncheres*. This is in reality the *Myoxus chrysurus* of Zimmermann,⁹ variously accredited by later writers to Boddaert, Schreber, Shaw, etc., which was based on 'Le Lérot à queue dorée' of Allemand in Buffon's Hist. Nat., "Suppl. IV, ed. d' Holl. p. 164, pl. 67," and is therefore a prior name for Desmarest's *Echymys cristatus*,¹⁰ Desmarest citing both the "Lérot à queue dorée, Buffon, Suppl., tom. 7, pl. 72," and "*Hystrix chrysuros* Boddaert, Elench. mamm.," these references

case, except for *E. spinosus*, where it was doubtless accidentally omitted, as this species is also claimed for E. Geoffroy by his son Isidore. These species are as follows:—

1. "*Echymys huppé* (*Echymys cristatus*) Geof. Lérot à queue dorée Buff., . . . *Hystrix chrysuros* Boddaert . . ." (p. 55).

2. "*Echymys dactylin*, *Echymys dactylinus*, Geoffroy" (p. 57).

3. "*Echymys épineux*, *Echymys spinosus*; Rat épineux de Azara . . . ; *Echymys roux*, Cuvier . . ." (p. 57).

4. "*Echymys à aiguillons*, *Echymys hispidus*, Geoff." (p. 58).

5. "*Echymys didelphoide*, *Echymys didelphoides*, Geoff." (p. 58).

6. "*Echymys* de Cayenne (*Echymys cayennensis*) Geoffr.; d'abord Rat de la Guyane, du même" (29).

7. "*Echymys soyeux* (*Echymys setosus*) Geoffroy" (p. 59).

8. Syst. Mamm. et Avium, 1811, 90.

9. Geograph. Geschichte, IV, 1780, 352.

10. Nouv. Dict. d'Hist. Nat., nouvelle ed., X, 1817, 55.

being also based on Allemand. It is thus evident that the specific name *chrysurus* of Zimmermann has many years' priority over *cristatus* of Desmarest, both having been founded on Allemand's L  rot    queue dor  e. (For the pros and cons of this case, see Isidore Geoffroy Saint-Hilaire, *l. c.*, pp. 6 and 7.) It is further evident that the type of *Loncheres* is the *Echimys cristatus* of recent authors, although Lichtenstein in 1820¹ attempted to restrict the genus *Loncheres* to *L. paleacea*, then for the first time described, he also referring all of the previously described species of *Echimys*, which he saw fit to recognize, to *Loncheres*. His species are (1) *L. paleacea* "Ill.," (2) *L. chrysuros*, (3) *L. rufa* (= *E. spinosus* Desm.), (4) *L. myosurus*, sp. nov. (= *E. cayennensis* Desm.). Later Lichtenstein strangely referred² all of these species except *L. paleacea*, to *Mus*, which he retained as the type and only species of *Loncheres*. In 1829 Fischer adopted³ *Loncheres* for the eight species described by Desmarest and the *L. paleacea* of Lichtenstein, ignoring *Echimys* altogether. On the other hand Rengger in 1830⁴ adopted *Echimys*, citing *Loncheres* as a synonym of it. The two species he had occasion to mention are the *E. spinosus* Desm. and *E. longicaudatus*, sp. nov.

In 1837, in an extract from an unpublished paper by Jourdan, F. Cuvier⁵ added the genus *Nelomys* Jourdan, with *N. blainvillii*, sp. nov.,⁶ as type. According to F. Cuvier, Jourdan joined with this, under *Nelomys*, "l'*Echimys* hupp  " (= *E. cristatus* of authors), which led Cuvier to remark: "Cette r  union suffirait pour indiquer les rapports des *N  loms* avec les *Echimys*, l'*Echimys* hupp     tant le type de dernier genre, si, en effet, les *Echimys* formaient un genre naturel." Cuvier comments on the fact that the group of *Echimys*, consisting of nine or ten species, includes forms that differ much from each other in the structure of the teeth. He also states, as shown above, that he considers l'*Echimys* hupp   (= *E. cristatus* Desm.) as the type of

¹ Ueber die Ratten mit platten Stacheln. Von Herrn Lichtenstein. (Vorgelesen den 15 Januar 1818.) Abhandl. der K  nigl. Akad. der Wissen. in Berlin, aus den Jahren 1818-1819, pp. 187-196. The volume is dated 1820.

² Darstellung neuer oder wenig bekannter S  ugethiere, 1827-1834, pl. xxxv, fig. 1, and pl. xxxvi, with the text belonging thereto.

³ Syn. Mamm., 1829, pp. 306, 307, 588.

⁴ Naturg. der S  ugethiere von Paraguay, 1830, pp. 233-237.

⁵ Rapport sur un m  moire de M. Jourdan, de Lyon, concernant quelques Mammif  res nouveaux. Par M. F. Cuvier, Ann. des Sci. Nat., s  r. 2, VIII, 1837. Cf. pp. 370, 371.

⁶ Described in a footnote to page 371, the description being an inedited extract, in marks of quotation, from Jourdan's paper.

the genus *Echimys*, and, further, that *Echimys dactylin* is an aberrant species.

This was the state of the subject when I. Geoffroy Saint-Hilaire, the following year, took up the revision of the American Spiny Rats. His conclusions were first published in abstract in 1838,¹ and in full in 1840.² This author, aided by the types of nearly all the species named by his father, E. Geoffroy,³ and first published by Desmarest in 1817, and thirteen skulls, representing in all ten species, was able to throw great light upon this difficult and as yet very imperfectly studied group. His memoir, as published in full in 1840 (*l. c.*), opens with an admirable historical résumé of the subject, followed by detailed analytical and comparative descriptions of both the external characters and the dentition, rendering, with the accompanying plates (eight illustrating the external features and two the dentition), his memoir of the highest importance as a trustworthy starting point for subsequent investigators. In matters of nomenclature, however, he naturally followed the customs of the day, disregarding the rule of priority, and adopting methods of selecting types for his genera unfortunately contrary to those required by modern rules of nomenclature. Thus, for example, he considered that the species named *chrysurus* (as he supposed by Boddaert, and later adopted by various writers, as Shaw, Lichtenstein, and Fischer) should be eliminated "du système zoologique comme purement nominale," because it "ne diffère pas de *Echimys cristatus*," described twenty-five years later. While it is true that the *Lérot à queue dorée* of Buffon was based on an immature specimen preserved in spirits, received through Dr. Klockner from Surinam, and that *Echimys cristatus* was based on an adult example from Guiana, neither I. Geoffroy (*cf. l. c.*, pp. 6, 7, and 49), nor any author who has considered the question, has ever doubted that the two specimens are referable to one and the same species.

In this paper I. Geoffroy added two new species, and divided

¹ Notice sur les Rongeurs épineux désignés par les auteurs sous les noms d'*Echimys*, *Lonchæres*, *Heteromys* et *Nelomys*, par M. Isidore Geoffroy Saint-Hilaire. (Présentée à l'Académie des Sciences le 25 juin 1838.) (Extrait.) *Ann. des Sci. Nat.*, sér. 2, X, 1838, pp. 122-127.

² *Mag. de Zool.*, sér. 2, 1840, Mammifères, pl. xx-xxix, pp. 1-57.

³ "Presque tous les originaux des déterminations de mon père existent encore du muséum"; and, he adds, "c'est d'après eux surtout que j'essaierai plus bas la révision de toutes ces espèces, en m'aidant de l'examen de leurs crânes et de leurs dents, et de leur comparaison avec les individus rapportés depuis au muséum par d'autres voyageurs ou décrits par divers naturalistes."—*Mag. de Zool.*, 1840 (*l. c.*, p. 2).

the old genus *Echimys* of F. Cuvier and subsequent French authors into three, namely, *Echimys*, *Nelomys*, and *Dactylomys*, the latter being new. These innovations all date from 1838, being covered by the abstract, although the paper in full was not published till 1840. The three genera are founded mainly on differences in the conformation of the teeth, and on the form and relative size of the feet; the size and shape of the ear, and the condition of the tail as to whether naked or clothed, being considered as not characters of generic importance. His genera (1838) are (1) *Echimys*, with six species, including one new, and one doubtful; (2) *Nelomys*, with also six species, including one new; (3) *Dactylomys*, with one species. These three genera and thirteen species, in the order of the memoir proper (1840) are as follows¹:

I. DACTYLOMYS.

1. *D. typus* = *E. dactylinus* Desm.

II. NELOMYS.

2. *N. cristatus* (Desm.).
 3. *N. paleaceus* (Licht.).
 4. *N. blainvillii* Jourdan.
 5. *N. semivillosus*, sp. nov.
 6. *N. didelphoides* (Desm.).
 7. *N. armatus* I. Geoff. = *Mus. hispidus* Licht., not *E. hispidus* Desm.

III. ECHIMYS.

8. *E. setosus* Desm.
 9. *E. cayennensis* Desm.
 10. *E. myosurus* (Licht.) = *Loncheres longicaudatus* Rengg.
 11. *E. albispinus*, sp. nov.
 12. *E. spinosus* Desm.
 13. *E. hispidus* Desm.

Of the generic distinctness of *Dactylomys* there is of course no question, and it can be set aside without further consideration as being in no way involved with *Echimys*, *Loncheres*, or *Nelomys*. Respecting *Nelomys*, he says: "J'ai trouvé que l'*Echimys cristatus* et le *Nelomys blainvillii* sont bien, comme l'a avancé M. Jourdan et comme l'a admis M. Frédéric Cuvier, deux espèces parfaitement congénères." Consequently *Nelomys* (type *N. blainvillii*) Jourdan is a pure synonym of *Loncheres*, which, on the principle of elimination, has *E. cristatus* as its type.

Respecting *Echimys*, I. Geoffroy says: "Ce genre, appelé *Loncheres* par Illiger, comprenait, avec les espèces qui s'y trouvent conservées, celles qui sont présentement séparées sous les

¹ The authority for *Echimys*, and for all the species here assigned to Desmarest, is given as "Geoff. St.-Hilaire" (= E. Geoff. St.-Hilaire), from their having been first named by his father, although admittedly not published by him, but by Desmarest.

noms générique de *Dactylomys* et de *Nélomys* (*l. c.*, p. 51). He here restricts the name *Echimys* "aux espèces analogues par leur organization à l'*Echimys setosus*" (*l. c.*, p. 30). As, however, the type of *Echimys* should be one of the two species originally referred to it, the type is properly *E. spinosus* Desm., unfortunately a species not strictly congeneric with *E. setosus* Desm., now referred to the genus *Mesomys* Wagner (1845).

Mesomys was originally based¹ on a tailless specimen from Borba, Brazil, which was also the basis of the type species, *Mesomys ecaudatus* (sp. nov. ex Natterer MS.). The genus is here characterized as follows: "Habitus Loncherium, dentes Echinomyum, spinæ validæ, cauda nulla"; and he adds: "Die einzige mir bekannte Art ist *Mesomys ecaudatus* Natt." Quoting later from Natterer's manuscript notes, he says the specimen was a pregnant female, and though the young were still very small, they had short tails.² This shows that the tailless condition of the type of *Mesomys*, was only the frequent abnormality common to the various species of South American Spiny Rats.³ Winge and Trouessart associate with this species *E. spinosus* Desm., as well as certain other species, but I find no satisfactory account of the dentition of *M. ecaudatus*. In any case, the type of *Echimys* is *E. spinosus* Desm. Therefore the large group of species now currently referred to *Echimys*, namely the *E. cayennensis* group, is still in need of a name, since *Dactylomys* I. Geoffroy (1838), *Isothrix* Wagner (1845), *Lasiuromys* Deville (1852), *Thrinacodus* Günther (1879), *Thricomys* Trouessart (1880), and *Kannabateomys* Jentink (1891), are all so different from the present group as not to require consideration in this connection. *Nelomys* Jourdan (1837) and *Phyllomys* Lund (1841) are both, apparently, synonyms of *Loncheres*.

The foregoing may be summarized as follows:—

1. The name *Echimys* was given to a genus of mammals by Étienne Geoffroy Saint-Hilaire in 1808 or 1809, in a work still unpublished.

2. *Echimys* as the name for a genus of mammals was first published by F. Cuvier in 1809, from a manuscript work by E.

¹ Arch. f. Naturg., 1845, i, 145.

² Abhandl. der II Cl. d. k. Akad. d. Wiss. München, V, Abthl. 2, 1848, 205.

³ On this condition in *Echimys trinitatis* see Allen and Chapman, Bull. Am. Mus. Nat. Hist., V, 1893, 226.

Geoffroy Saint-Hilaire, and was exclusively based on (1) "le L  rot    queue dor  e" of Allemand (in Buffon), named *Myoxus chrysurus* by Zimmermann in 1780, and *Echimys cristatus* by Desmarest (ex E. Geoffroy, MSS.) in 1817; and (2) le "Rat   pineux" of Azara, named *Echimys spinosus* by Desmarest in 1817 (ex E. Geoffroy MS.).

3. In 1812 F. Cuvier further characterized the genus *Echimys*, from the same two species above named.

4. Therefore one of these two species, as they are not congeneric, must be taken as the type of *Echimys*.

5. Illiger, in 1811, established the genus *Loncheres*, referring to it two species, namely, (1) *L. paleacea*, a species not described till nine years later, and (2) "*Hystrix chrysuros* LinGmel.," = *Myoxus chrysurus* Zimm.

6. As an undescribed species cannot be taken as the type of a genus, *Myoxus chrysurus* Zimm. (= *Echimys cristatus* Zimm.) becomes the type of *Loncheres*.

7. This, by the process of elimination, leaves *Echimys spinosus* Desm. as the type of *Echimys*.

8. *Nelomys* Jourdan (1837), based on a species (*Nelomys blainvillii* Jourd.) currently recognized as congeneric with *Echimys cristatus* Desm. (= *Myoxus chrysurus* Zimm.), is therefore a pure synonym of *Loncheres*.

9. *Mesomys* Wagner (1845) was based on a species (*Mesomys ecaudatus* Wagner) currently treated as congeneric with *E. spinosus* Desm., and is therefore in all probability a pure synonym of *Echimys*. If otherwise (I am unable to find a satisfactory account of the dentition of *Mesomys*), *Mesomys* will not conflict with *Echimys*.

10. In 1817 Desmarest described the following seven species under *Echimys*, adopting therefor E. Geoffroy Saint-Hilaire's manuscript names. These species are:

- | | |
|--------------------------------|----------------------------------|
| 1. <i>Echimys cristatus</i> . | 5. <i>Echimys didelphoides</i> . |
| 2. <i>Echimys dactylinus</i> . | 6. <i>Echimys cayennensis</i> . |
| 3. <i>Echimys spinosus</i> . | 7. <i>Echimys setosus</i> . |
| 4. <i>Echimys hispidus</i> . | |

11. The subsequent history of these species, in relation to the genus *Echimys*, is as follows:

a. In 1811 *Echimys cristatus* became the type of *Loncheres* Illiger.

b. In 1838 *Echimys dactylinus* became the type of *Dactylomys* I. Geoffroy Saint-Hilaire.

c. *Echimys spinosus* was referred by Burmeister in 1854¹ to the genus *Mesomys* Wagner, who assumed (with Reinhardt, but doubtless incorrectly) that *Mesomys ecaudatus*, the type of *Mesomys*, was based on simply a tailless specimen of *E. spinosus*.

d. *Echimys cristatus* and *E. didelphoides* are still currently referred to *Loncheres*.

e. The remaining three species, *Echimys hispidus*, *E. cayennensis*, and *E. setosus*, are still referred to the genus *Echimys*, as the genus is now currently accepted.

12. The genus *Echimys*, as now currently accepted, is not the true *Echimys* of F. Cuvier, but *Echimys* as emended by I. Geoffroy Saint-Hilaire in 1838 and 1840, by improperly taking *E. setosus*, instead of *E. spinosus*, as the type.

13. For the group of species now commonly referred to *Echimys* no name hitherto proposed is available.

In view of the foregoing it seems necessary to provide a name for the group containing *Echimys cayennensis*, *E. hispidus*, and *E. setosus* of Desmarest (1817, ex I. Geoffroy Saint-Hilaire), and the allied species since described, for which I here propose

Proëchimys, gen. nov.

Echimys I. GEOFFROY SAINT-HILAIRE, Ann. des Sci. Nat. sér. 2, X, 1838, 125; Mag. de Zool., sér. 2, 1840, 30. Not *Echimys* of F. Cuvier, 1809, ex I. Geoffroy Saint-Hilaire, MS.

Type, *Echimys trinitatis* Allen and Chapman.

The following, besides other species, seem probably referable to *Proëchimys*:

- | | |
|---|---|
| 1. <i>Proëchimys cayennensis</i> (Desm.). | 9. <i>Proëchimys chrysæolus</i> (Thomas). |
| 2. " <i>hispidus</i> (Desm.). | 10. " <i>decumanus</i> (Thomas). |
| 3. " <i>setosus</i> (Desm.). | 11. " <i>gymnurus</i> (Thomas). |
| 4. " <i>albispinus</i> (I. Geoff.). | 12. " <i>trinitatis</i> (A. & C.). |
| 5. " <i>dimidiatus</i> (Günther). | 13. " <i>canicollis</i> (Allen). |
| 6. " <i>ferrugineus</i> (Günther). | 14. " <i>urichi</i> (Allen). |
| 7. " <i>semispinosus</i> (Tomes). | 15. " <i>mincæ</i> (Allen). |
| 8. " <i>centralis</i> (Thomas). | 16. " <i>cherriei</i> (Thomas). |

¹ Thierye Brasiliens, I, 1854, 205.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs' forms a separate and complete monograph, varying in size from 24 to 100 or more pages, with numerous plates, mostly lithographic. The Parts of the 'Memoirs' thus far issued are as follows:

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VII, 1895.....	Price, \$4.00
" II, 1887-90.....	4.75	" VIII, 1896.....	" 4.00
" III, 1890-91.....	4.00	" IX, 1897.....	" 4.75
" IV, 1892.....	4.00	" X, 1898.....	" 4.75
" V, 1893.....	4.00	" XI, Part I, 1898.....	" 1.25
" VI, 1894.....	4.00	" " " II, 1899.....	" 2.00

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris;

R. FRIEDLÄNDER & SOHN, Berlin;

and at the Museum.

Note on the Wood Bison.

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIII, ARTICLE VI, pp. 63-67.

New York, April, 16 1900.

The Knickerbocker Press, New York

Article VI.—NOTE ON THE WOOD BISON.

By J. A. ALLEN.

The Museum has recently obtained a head (skull and unmounted head skin) of the Wood Bison, taken by Indians near Great Slave Lake. The exact point is not known, but it is evidently a freshly killed specimen, and is in excellent condition. It is a young male, probably about four years old, the second upper molar being wholly unworn, and the third molar not having yet broken through its alveolus. Compared with specimens of the Plains Bison (*Bison bison*) of corresponding age, it is rather above the average size of the latter, with the base of the horn cores relatively thicker. The head skin has the whole pelage darker, softer, and more silky than the Bison of the Plains, this specimen agreeing, in this respect, with several mounted heads of the Wood Bison I have seen in the possession of dealers within the last few years.

The present specimen confirms, as far as it goes, the characters recently assigned to the Wood Bison by Mr. S. N. Rhoads (Proc. Acad. Nat. Sci. Phila., 1897, p. 488), and quite warrant its recognition under the name *Bison bison athabascæ*, applied to it by Mr. Rhoads. Formerly it doubtless completely intergraded with the southern form. Now that it is on the point of extinction, the following summary of its recent decadence may not be without interest.

As is well known, the American Bison formerly ranged continuously from the northern boundary of the United States northward over the Saskatchewan plains to the region about Great Slave Lake, in latitude 60° north, and even, according to Richardson,¹ "to the vicinity of Great Marten Lake, in latitude 63° or 64°." Their range in the north, as well as in the south, gradually became more and more restricted, the last remnants consisting of only a few widely separated bands.

There is abundant historic evidence to show that the Wood Bison formerly ranged from the Liard River, in latitude 60°, eastward to the eastern end of Great Slave Lake, and from the district just northwest of Great Slave Lake southward, including the half-open country on both sides of Great Slave River, to the

¹Fauna Bor.-Am., I, 1829, p. 279.

western end of Lake Athabasca, and westward to the east base of the Rocky Mountains. On my map,¹ intended to show the approximate range of the Bison in 1875, its northern limit is given as not extending much beyond Peace River, while in 1889 Mr. Hornaday gave its supposed area as a very limited district, wholly to the south of Peace River.² It is quite probable that both maps were in this respect erroneous. Mr. Hornaday's plotting of this portion of his map was doubtless based on Prof. John Macoun's statement in his 'Manitoba and the Great North-West,' published in 1883, in which he says (p. 342): "In the winter of 1870 the last buffalo were killed north of Peace River; but in 1875 about one thousand were still in existence between the Athabasca and Peace Rivers, north of Little Slave River."

According to Warburton Pike,³ in 1890 "a few bands of buffalo" were scattered over a considerable area of country between the Liard River and Great Slave Lake, and thence south to Peace River. "Sometimes," he says, "they are heard of at Forts Smith and Vermillion, sometimes at Fort St. John close up to the big mountains on Peace River, and occasionally at Fort Nelson on the south branch of the Liard. It is impossible to say anything about their numbers, as the country they inhabit is so large, and the Indians, who are few in number, usually keep to the same hunting-ground." The site of his own successful hunt for these animals, in February, 1890, was on a tributary of Buffalo River, about fifty miles south of its entrance into Great Slave Lake.

It was near this point that Frank Russell hunted them in 1894, with the same Indian guide, but without success. He says: "At the end of the fourth day [from Fort Resolution] we reached the northern limit of the buffalo range, perhaps fifty miles south of the Great Slave Lake." Owing to stormy weather, Mr. Russell failed to reach the herd, being compelled to turn back without seeing a single bison. Concerning their numbers, haunts, and prospects he writes as follows⁴:

"The herd at present consists of a few hundred only. They are so wary that but one effective shot can be fired when they be-

¹ The American Bison, Living and Extinct. Mem. Geol. Surv. Kentucky, Vol. I, Part ii, 1876, and Mem. Mus. Comp. Zool., Vol. IV, No. 10, 1876.

² The Extirpation of the American Bison. Report of the U. S. Nat. Mus., 1886-87 (1889), pp. 369-548, pll. i-xxii.

³ Barren Ground of Northern Canada, 1893, p. 143.

⁴ Explorations in the Far North, 1898, pp. 231, 232.

take themselves to instant flight, and, as with the moose, pursuit is altogether futile. They cannot be hunted in summer as the country which they inhabit is an impenetrable, mosquito-infested, wooded swamp at that season. . . . They can only be killed by stalking in midwinter when their pelage is at its best. . . .

"The Indians along the Peace and Slave Rivers make occasional trips into the buffalo country with dog teams to establish lines of marten traps. When they discover a band of buffaloes they of course kill as many as they can, but they have not made systematic efforts to hunt them for their robes, as they have the musk-ox. Fortunately, the officers of the Company have exerted their influence toward the preservation of the buffalo, not trading for the robes, until the recent advent of rival traders. During the winter of 1892-3 forty buffaloes were killed, the largest number that had been secured for several years. I saw most of these robes which were very dark, the hair thick and curled, making a robe superior to that of either musk-ox or plains buffalo; they were so large that the Indians had cut many of them in halves for convenience in hauling on the sleds.

"From 20 to 100 MB [\$10 to \$50] are paid for the robes. The traders are trying to induce the Indians to preserve them as mountable skins.

"The northern limit of the range of the buffalo, as given by Mackenzie, was the Horn Mountains, north of the Little Lake. Père Ruore, of the Saint Michael Mission at Rae, who has crossed the Rae-Providence traverse several times, assured me that he had seen buffalo skulls on the prairies which lie within fifty miles of Providence, northwest of the western end of the Great Slave Lake. I saw no remains of buffaloes when I crossed these prairies in December, owing to the snow, but the country is similar to that south of the lake where they are still found.

"Black Head, an old Yellow Knife chief, living at the mouth of the Rivière au Jean, told me that he had killed 'plenty of buffaloes' in the delta of the Slave River. About fifteen years ago a few were killed near Liard, but they are seldom seen in that quarter. They formerly frequented the 'Salt Plains,' forty miles northeast of Fort Smith. Franklin's party killed a buffalo in that vicinity at the time of their visit in 1820.¹ Richardson states that

¹ Sir John Franklin, *Narrative*, p. 177.

in 1848 there was an abundance of deer and buffalo meat obtainable on the Salt Plains.”¹

Still later information is furnished by Thomas Johnson, in a quotation from the report of Game Inspector Jarvis to the Canadian Government, published in ‘Forest and Stream’ for Oct. 23, 1897 (Vol. XLIX, p. 323). His inspection of the region embracing the present range of the Bison was made in 1897, and in his report he says: “I have taken great pains in making as thorough inquiries as possible in connection with the buffalo, their habits, number, and range. The range of a scattered band of about 300 is from Peace Point to Salt River, and from Salt River to within twenty miles of Fort Resolution, on Great Slave Lake. I met a Mr. Handbury, an English sportsman, who is on a hunting expedition. He had just returned from an unsuccessful buffalo hunt, but he saw fresh tracks and beds of about sixty buffalo. Mr. Handbury returns this year, but the fear of a \$200 fine will hardly prevent his hunt. . . . If it be the intention of the Government to protect these nearly extinct animals, it can only be done by placing officials on the spot. I have in the case of buffalo and other game impressed on all hunters and other interested persons the necessity of obeying the game act, and have left printed notices where practicable.”

Mr. Rhoads, in his ‘Notes on Living and Extinct Species of North American Bovidæ’ (Proc. Acad. Nat. Sci. Philadelphia, 1897, p. 497), published a letter from Mr. H. I. Moberly, of the Hudson Bay Company, dated Nov. 9, 1897, in which Mr. Moberly states: “They lived formerly from the beginning of the wooded country north of the Saskatchewan to Great Slave Lake, and further north along the east slope of the Rocky Mountains. At present there are not more than two hundred and fifty to three hundred alive, and they are in two bands, one on the lower Peace River, north of it, and run from close to Great Slave Lake at Peace Point, which is some ninety miles below Fort Vermillion. The other is on the upper Hay River and ranges between Peace River and Liard River, and run down some two hundred and fifty miles east of the Rocky Mountains and up to the foot of the Rocky Mountains.”

This brings the history down to Mr. Stone’s report, published

¹ Arctic Searching Expedition, p. 149.

in this volume of the Bulletin (*antea*, p. 41), in which he states that he does not think the present number exceeds 50, and that their complete extinction, in spite of the efforts of the Canadian Government to protect them, will be consummated within the next three years.

The number of Wood Bison estimated to exist at different times during the last ten years may be summarized as follows :

Hornaday, 1889.....	550
Russell, 1894.....	a few hundred.
Jarvis, 1897.....	about 300.
Moberly, 1897.....	250-300.
Stone, 1899.....	50.

From the above it appears that the Wood Bison, during the last six years at least, have occupied a portion of country considerably to the north of the region where they were located by Mr. Hornaday in 1889, and by myself in 1876. It is likely, however, that they never wholly forsook the region they now occupy, and that the two maps above cited were in this respect erroneous. It is pretty safe now to assume, however, that they have been entirely exterminated from their former range south of the Peace River, and that a few years more will suffice for their complete extermination.

The extirpation of the Plains Bison (*Bison bison*) has already been practically effected. Mr. E. Hough of Chicago, an excellent authority on this subject, states in a recent number of 'Forest and Stream' (Vol. LIV, No. 12, p. 248, March 31, 1900), that in 1895 there were possibly 20 to 25 wild examples in different parts of Montana, Wyoming, and Colorado, and 100 to 125 in the Yellowstone National Park. Now (March, 1900) he says : "On the face of all discoverable information on this head it is safe to say there are not a dozen live wild buffalo outside the Yellowstone Park in the United States, and if there is a single one I do not know where it is. Inside the Park there may be 20 head or so."

The different domesticated herds he estimates may contain, all told, "between 300 and 500."

Thus the American Bison is already practically exterminated in the wild state, and its perpetuation depends upon the care and skill exercised to preserve the domesticated herds.



PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs' forms a separate and complete monograph, varying in size from 24 to 100 or more pages, with numerous plates, mostly lithographic. The Parts of the 'Memoirs' thus far issued are as follows:

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VII, 1895.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" VIII, 1896.....	" 4.00
" III, 1890-91.....	" 4.00	" IX, 1897.....	" 4.75
" IV, 1892.....	" 4.00	" X, 1898.....	" 4.75
" V, 1893.....	" 4.00	" XI, Part I, 1898	" 1.25
" VI, 1894.....	" 4.00	" " II, 1899	" 2.00

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

10

*List of Bats Collected by Mr. H. H. Smith
in the Santa Marta Region of Colombia,
with Descriptions of New Species.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XIII, ARTICLE VIII, pp. 87-94.

New York, May 12, 1900.

The Knickerbocker Press, New York

Article VIII.—LIST OF BATS COLLECTED BY MR. H.
H. SMITH IN THE SANTA MARTA REGION
OF COLOMBIA, WITH DESCRIPTIONS
OF NEW SPECIES.

By J. A. ALLEN.

This second paper on the collection of mammals made by Mr. Herbert H. Smith in the Santa Marta region of Colombia,¹ presented to the Museum by Mr. Morris K. Jesup, relates exclusively to the Bats, which number about 175 specimens, and are referable to 22 species, of which 3 appear to be hitherto undescribed. Of the species here recorded only 7 are included in the collection made by Mr. W. W. Brown, Jr., for Mr. Outram Bangs, in the same general region.² Mr. Bangs's list numbers 10 species, the 3 not yet sent by Mr. Smith being *Vampyrops lineatus* (E. Geoffroy), *Dermanura quadrivittata* Peters, and *Uroderma planirostris* (Spix). In all probability this total of 25 species will be considerably extended by the results of Mr. Smith's further work in this region.

1. *Diphylla ecaudata* Spix.—One specimen, Cacagualito (altitude 1500 feet), May 26.

2. *Desmodus rufus* Wied.—Sixteen specimens, Bonda, January, March, June, and July—13 adult and 3 juv.

These specimens represent two sharply defined color phases, 9 being in the rufous phase, like the type of *D. rufus* Wied, and 7 in the gray phase, like the type of *D. murinus* Wagner. As there are no appreciable differences between the two series except in color, the natural inference is that the species is dichromatic.

In the rufous phase the color above is dark rufous brown, the hairs basally light yellow; below pale yellowish brown, the hairs uniform from base to tip, the tips slightly silvery. In the gray phase the color above is blackish brown, the basal half of the hairs grayish white; below lustrous silvery gray at the surface, the hairs darker (pale brown) basally.

¹ For the first paper, 'New Rodents from Colombia,' etc., see this Bulletin, Vol. XII, 1899, pp. 195-218.

² See Proc. New England Zoölogical Club, Vol. I, 1899, pp. 100-102.

There are males and females in both series; the males are considerably smaller than the females, the length of the forearm averaging in the males 55 mm. and in the females 60 mm.; metacarpal II in the males, 49 mm., in the females, 53.5 mm.

3. *Chiroderma jesupi*, sp. nov.

Type, and only specimen, No. 14574, ♂ ad., skin and skull, Cacagualito, Colombia, May, 1898; coll. H. H. Smith.

Similar in skull and teeth to *Chiroderma salvini*, but smaller and with no head stripes.

Above uniform dark brown, the hairs dark brown at base, with a broad median band of ashy white, and tipped broadly with dusky brown; sides and front of neck and upper part of chest grayish brown, the hairs basally and for the greater part of their length grayish white; rest of lower surface pale brown to base of pelage, the tips of the hairs slightly grayish. No head stripes and no dorsal line. Ears small, brown. Interfemoral membrane above well haired to near the posterior border, naked below; wing membrane heavily furred to a line drawn from elbow to knee, as is also the humerus and muscular part of the forearm. Wing membrane from the foot.

The skull is in general similar to that of *C. salvini*, but smaller, with weaker dentition; the middle upper incisors, however, are slender, terete, perfectly erect and parallel, thus differing markedly from the same teeth in *C. salvini* and *C. villosum*.

Measurements.—"Extent, 350"; forearm, 40; thumb, 10; metacarpal II, 36; 3d finger—metacarpal, 39, 1st phalanx, 15, 2d phalanx, 23, 3d phalanx, 19; 4th finger—metacarpal, 33, 1st phalanx, 14, 2d phalanx, 15.5; 5th finger—metacarpal, 38, 1st phalanx, 10, 2d phalanx, 13; tibia, 17; foot, 12; calcaneum, 7. (All the measurements, except the first, are from the dry skin.)

Skull.—Greatest length, 24; breadth of rostrum at canines, 5.2; interorbital breadth, 5.8; breadth behind supraorbital processes, 5.8; zygomatic breadth, 15; mastoid breadth, 11.6; median length of bony palate, 9.6; width of same between last molars, 5.6; length of upper tooththrow (exclusive of incisors), 6.7; mandible, 15; lower tooththrow, 7.5.

The slender, erect, parallel middle upper incisors serve at once to distinguish this species from any of its described allies.

Named in honor of Morris K. Jesup, President of the American Museum of Natural History, to whom the Museum is indebted for the very large collection of Colombian mammals of which the present fine series of bats forms a part.

4. *Vampyrops vittatus* (*Peters*).—Two specimens, Valparaiso (altitude 4500 feet), April 29 and June 10. Sex not indicated.

The collector's measurements are : Extent, 480 and 484 ; length, 95 and 100 ; length of wing (from carpal joint), 134 and 137.

5. *Uroderma bilobatum* *Peters*.—Fourteen specimens, as follows : Bonda, 11, May 24–June 4 ; Cacagualito, 2, May 14 and 25 ; Minca, 1, July 9.

6. *Artibeus palmarum* *Allen & Chapman*.

Artibeus femurvillosus BANGS, Proc. New Engl. Zool. Club, I, 73, Nov. 24, 1899. La Concepcion, Colombia.

Three specimens, Bonda, May 24 and August 29. "Extent, 506 ; length, 115 ; wing (from carpal joint), 155 mm." (collector's measurements).

These specimens and two from Cali, western Colombia (J. H. Batty), do not appear to differ from Trinidad examples, to which *A. femurvillosus* Bangs is also referable.

7. *Glossophaga soricina* (*Pallas*).—Six specimens, Bonda, February, June, and July.

8. *Glossophaga longirostris* *Miller*.—Thirty-four specimens, of which 28 are from Taguaga, from "a cave on the seashore," June 22 and 23, and 3 from Bonda, March, June, and November. One of the specimens from Taguaga is labelled, "contained a full-grown fœtus."

This species was described by Mr. Miller (Proc. Acad. Nat. Sci. Phila., 1898, p. 330) from a single specimen in the Bangs collection, taken in the "Santa Marta Mountains (near Santa Marta), Colombia, February 10, 1898." It is well distinguished by its large size and dark coloration, and is perfectly distinct from *G. soricina* from near-by localities. Mr. Miller's specimen lacked all of the incisors. He says : "Distinct traces of the alveoli can still be seen in the mandible, but these are nearly obliterated in the upper jaw. Whether this condition is normal, as in the genus *Lichonycteris*, it is, of course, impossible to say." In nearly one-half of the present series of 34 specimens the incisors are all present in both jaws ; in about one-third of the series they are entirely absent in both jaws ; in the remainder some of the incisors are present and the alveoli of those lacking

are clearly indicated. Apparently they are absent, as a rule, only in old specimens.

As noted above, all of the specimens except three were taken from caves at Taguaga, on the seashore. As this series contained no specimens of *G. soricina*, apparently the two species are not intimately associated in life, though examples of both were taken at Bonda, near Taguaga.

9. Hemiderma brevicauda (Wied).—Fourteen specimens, Bonda, April 27 and June 14.

10. Phyllostoma hastatum (Pallas).—One specimen, in alcohol, from Bonda, May, 1898. This is a very large and very old individual, the teeth being greatly worn.

11. Trachops cirrhosus (Spix).—One specimen, Bonda, June 12.

12. Micronycteris megalotis (Gray).—Thirteen specimens, Bonda, May 26, June 13–20, August 8, and November 20.

13. Micronycteris hypoleuca, sp. nov.

Type, No. 15131, ♀ ad. (skin without skull), Bonda, July 9, 1899; coll. H. H. Smith.

About the size of *M. minuta*, but white below instead of ashy, and the basal portion of the pelage above white instead of ashy white.

General color above dark reddish brown, the basal half of the pelage white with a faint tinge of yellowish; below white to the base of the pelage, with a faint yellowish tinge, the hairs posteriorly on the sides faintly ashy brown subterminally; colors of dorsal and ventral surfaces sharply defined. Ears brown, furred about as in *M. megalotis*; proximal fourth of forearm above covered with short fur. Forearm long in proportion to the rest of the wing, the forearm about equalling the length of the forearm in *M. megalotis*, while the third finger is much shorter than in that species. Foot long and narrow, much longer than in *M. megalotis*, although the latter is a much larger species.

Measurements.—"Total length to end of tail, 60"¹; ear, 14; nose leaf, 3.5 x 5.5; forearm, 33; thumb, 8; third finger—metacarpal, 27, 1st phalanx, 11, 2d phalanx, 12, 3d phalanx, 9; fourth finger—metacarpal, 28, 1st phalanx, 9, 2d phalanx, 9; fifth finger—metacarpal, 28.5, 1st phalanx, 10, 2d phalanx, 8; tibia, 20; foot, 11; calcaneum, 8.

This species resembles *Schizostoma minuta* Gervais (Expéd. du Compte de Castelnau, Zool., I, 1855, Mamm., p. 50, pl. vii, fig.

¹ Collector's measurement from the fresh specimen; rest of measurements from the dry skin.

1, and pl. x, fig. 5), apparently agreeing with it in size, but differing from it in coloration. The type of *M. minuta* was from "Capella-Nova, dans le Brésil," on the upper Amazon, but a second specimen, still darker in color, from the Province of Bahia, was also referred to it by Gervais.

The single specimen on which *M. hypoleuca* is based unfortunately lacks the skull. It differs from descriptions of *M. minuta* by Gervais and Dobson in the yellowish white instead of grayish white underfur above, and in the clear white instead of ashy underparts.

14. *Chrotopterus auritus* Peters.—One specimen, ♀, Bonda, June 5. "Extent, 392; length, 95; wing (from carpal joint), 110."

15. *Dolichophyllum macrophyllum* (Wied).—One specimen, ♂, Bonda, July 9. "Extent, 335; length, 90; wing (from carpal joint), 85."

16. *Promops affinis*, sp. nov.

Type, No. 15109, ♀ ad., skin without skull, Taguaga, June 23, 1899; coll. H. H. Smith.

Size and general appearance of *Promops depressus* (Ward) from northern Mexico, but membranes and general coloration much darker, with heavier dentition and differently shaped ears.

Adult.—Above dark rufous brown, with the basal portion of the fur clear fulvous white; below similar but somewhat paler. Ears and membranes blackish brown.

Juv.—Above blackish brown, extreme base of hairs ashy; below sooty brown, the hairs ashy at extreme base and with the tips faintly ashy; ears and membranes black.

Measurements.—"Expanse, 423; total length, 136; wing from carpus, 111"; tail, 68, free portion of tail, 34; forearm, 60; thumb, 10; metacarpal II, 56; 3d finger—metacarpal, 59, 1st phalanx, 23, 2d phalanx, 21; 4th finger—metacarpal, 57, 1st phalanx, 20, 2d phalanx, 3; 5th finger—metacarpal, 27, 1st phalanx, 19, 2d phalanx, 5; tibia, 18; foot, 11.

This species is based on six specimens, only one of which (taken as the type) is adult, and this unfortunately lacks the skull. Although the immature examples almost equal the adults in size (the forearm ranging from 54 to 56 against 60 in the adult), four out of the five still retain the upper milk incisors.

These are slender, curved teeth, two on either side, obliquely inserted, with the tip strongly curved laterad. As the permanent incisors are already well developed, there are thus six upper incisors, arranged in two rows, an outer row of four milk incisors and an inner row of two permanent incisors.

The skull of *Promops affinis*, allowing for the immaturity of the specimens, closely resembles, in general form and character of the teeth, that of *P. depressus* (Ward) from Mexico. The two species are also practically of the same size and proportions, but in color *P. affinis* is much darker than *P. depressus*, and has the lower outer lobe of the ear much narrower, and the inflated upper internal border wider. They are obviously closely related forms, but their exact relationship can be determined only on comparison of a larger amount of more strictly comparable material.

A note by the collector attached to one of the specimens states: "This species congregates in narrow fissures of the coast rocks, just above the surf. When disturbed it crawls deeper into the crevices, but does not take flight (in the daytime) even when a gun is fired into its retreat."

I take the present opportunity to record what seems to be another undescribed species of *Promops*, from Peru, received a few years since from Mr. O. T. Baron, and hitherto wrongly identified.

***Promops milleri*, sp. nov.**

Molossus nasutus ALLEN, Bull. Am. Mus. Nat. Hist. IX, 1897, 115. (Not *M. nasutus* of Spix.)

Type, No. 118188, ♀ ad., Guayabamba, Peru (altitude 6000 feet), September 24, 1894; O. T. Baron.

Pelage very soft and thick, moderately long. Above dark sooty brown, hairs pale fulvous at extreme base; below similar but rather paler; ears and membranes black. Distribution of fur on the wing membrane, on the forearm, and between the fingers, much more restricted than in *Molossus rufus* or *P. abrasus*, and the naked margin of the outer surface of the ears is much broader. Ears moderate for a *Promops*, nearly meeting in front but not joined; tragus small, pointed, broadest at base. Tail extending about half its length beyond the membrane.

Measurements.—Collector's measurements from four fresh specimens: Head and body, 81; tail, 46; hind foot, 15–16. Measurements of type, from skin:

Forearm, 57; thumb, 11; metacarpal II, 55; third finger—metacarpal, 59, 1st phalanx, 25, 2d phalanx, 20; fourth finger—metacarpal, 57, 1st phalanx, 21, 2d phalanx, 19; fifth finger—metacarpal, 31, 1st phalanx, 18, 2d phalanx, 5; tibia, 18; foot, 13; breadth across ears, 27.5.

Skull.—The skull is massive, and the teeth are broad and heavy; rostral portion of the skull much broader than the interorbital. The upper canine is in strong contact with pm.² so that the very small pm.¹ stands on the outer edge of the toothrow. The upper incisors are strongly curved and arch forward, projecting much beyond the canines.

Total length, 23.5; basal length, 20; breadth of rostrum at base of canines, 6; greatest breadth of rostrum, 7.5; least interorbital breadth, 5; zygomatic breadth, 14; mastoid breadth, 12.5; palatal length, 10; distance between last molars, 5; upper toothrow (exclusive of incisors), 9.5; mandible, 18; lower toothrow (exclusive of incisors), 10.

Promops milleri is based on four adult females, all remarkably uniform in size and coloration, from Guayabamba, Peru, collected September 24, 1894, by Mr. O. T. Baron. They were at first referred to *Promops nasutus* (Spix), and I am indebted to Mr. Gerrit S. Miller, Jr., after whom the species is named, for calling my attention to its probable distinctness from this, apparently its nearest ally. It differs from this species in its much larger size, in the much lesser development of the furred areas on the forearm and wing membranes, in the form of the tragus, in the greater length of the exposed portion of the tail, and in the form of pm.², which is not higher than pm. 1. *P. milleri* is of about the size of *P. abrasus* (auct.), but differs from it greatly through the less extension of the fur upon the proximal border of the wing membrane, in coloration, character of the tail, etc.

17. *Peropteryx canina* (Wied).—Five skins and three specimens in alcohol, Bonda, June and August.

18. *Saccopteryx bilineata* (Temm.).—Thirty-six specimens, 28 skins with skulls and 8 in alcohol: Bonda, 33, February, April, May, June, July, August, and September; Minca, 3, July and August.

This series represents two well-marked color phases, a black and a brown. In the black phase the color above is often black, more commonly deep brown black; below blackish brown, washed with ash gray. In the brown phase the color above is dark rusty brown; below pale brown, the tips of the hairs lighter.

A few specimens are practically intermediate and to some extent connect the two phases.

The white markings on the back vary much in distinctness in different specimens, being sometimes almost clear white and strongly defined, in other specimens brownish white, and sometimes obsolete.

There are seven young, two of which are very young and the others about two-thirds grown. These are nearly uniform blackish plumbeous above, somewhat lighter below, with the hairs slightly ashy-tipped.

19. *Saccopteryx leptura* (Schreber).—Two skins and three specimens in alcohol, Bonda, March, April, and June.

20. *Thyroptera tricolor* Spix.—One skin, without skull, Cacagualito, May 24.

21. *Myotis nigricans* (Wied).—Nine specimens, Bonda, June 14, July 24, August 14, and September 5. Three of the specimens are paler and browner than the others, but they apparently represent only a brownish phase of *M. nigricans*, as they do not differ appreciably from the others except in color.

22. *Lasiurus pallescens* (Peters).—One specimen, Bonda, July 6.

This is slightly smaller than Dr. Peters's type, from the "Andes de Merida" of western Venezuela, but apparently not otherwise different.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs' forms a separate and complete monograph, varying in size from 24 to 100 or more pages, with numerous plates, mostly lithographic. The Parts of the 'Memoirs' thus far issued are as follows:

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VII, 1895.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" VIII, 1896.....	" 4.00
" III, 1890-91.....	" 4.00	" IX, 1897.....	" 4.75
" IV, 1892.....	" 4.00	" X, 1898.....	" 4.75
" V, 1893.....	" 4.00	" XI, Part I, 1898	" 1.25
" VI, 1894.....	" 4.00	" " " II, 1899	" 2.00

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

6

*List of Birds Collected in the District of
Santa Marta, Colombia, by Mr.
Herbert H. Smith.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIII, ARTICLE XIV, pp. 117-183.

New York, August 25, 1900.

The Knickerbocker Press, New York

**Article XIV.—LIST OF BIRDS COLLECTED IN THE
DISTRICT OF SANTA MARTA, COLOMBIA,
BY MR. HERBERT H. SMITH.**

By J. A. ALLEN.

The basis of the present paper is a collection of 2834 birds collected under the direction of Mr. Herbert H. Smith, in the neighborhood of Santa Marta, Colombia, between sea-level and an altitude of about 8000 feet, from May 4, 1898, to September 7, 1899, and purchased for the American Museum of Natural History by its President, Morris K. Jesup, Esq., together with Mr. Smith's large collection of mammals obtained in the same region, as elsewhere noted.¹

The Smith Collection of birds numbers 304 species, and includes all but 84 hitherto recorded from this small area. As a matter of interest and convenience to future workers in this field I have interpolated in brackets the species not obtained by Mr. Smith's collectors, and as a matter of geographical interest have deemed it best to give a complete summary of our present knowledge of the distribution of the species definitely known from the district under consideration, and have therefore cited the previous records as given by Messrs. Salvin and Godman and Mr. Outram Bangs.

As Messrs. Salvin and Godman stated in 1879 (Ibis, April, 1879, p. 197), in their report on the collection made in this region by Mr. F. Simons in 1878 and 1879: "There are few places in South America of which the zoology is less known than that of the mountainous tract of land lying between the mouth of the Magdalena river and the Gulf of Maracaibo, usually known as the Sierra Nevada of Santa Marta. Though this district has been visited by botanical travellers, no zoologist has as yet penetrated into it; or, at any rate, no results of any such expedition have been made public.¹ If we except the immediate neighborhood of Santa Marta itself, where several collectors have worked for a

¹ Bull. Am. Mus. Nat. Hist., Vol. XII, 1899, p. 195.

² "In 1870 Mr. G. Joad, F.Z.S., rode round the Sierra Nevada from Santa Martha, and collected a few birdskins. Amongst these was the type of the new *Furnarius*, described by us in the 'Nomenclator' as *F. agnatus*, which was obtained at Valle Dupar."

short time, the remainder of this limited district is so little known that we can only recall the name of one bird, a Humming-bird (*Anthocephala floriceps*), found in it; and this was obtained by a botanist, so Mr. Gould tells us, near San Antonio, in the Nevada itself. Here, then, was a promising field for an ornithologist — this isolated mass of mountains, whose snowy peaks, visible from far out on the Caribbean Sea, form so striking a feature in the scenery on the northern coast of South America."

Mr. Simons worked mainly on the southern slope of the Sierra Nevada, at Valle Dupar, San Sebastian, Atanques, San José, and Chinchicua, these points varying in altitude from 700 to 11,000 feet. He ascended to 17,000 feet, and collected some specimens at altitudes above 14,000 feet. He also collected at Santa Marta and Minca, near the coast, and at Manaure, about ten miles south-east of Valle Dupar, on the eastern side of the valley of the Rio Cesar, at the foot of the western slope of the Cordillera de los Andes, and hence really outside of the Sierra Nevada region proper. A rectangular area of about 30 by 50 miles, the longer diameter being east and west, would include the whole district where Mr. Simons collected, and much more than cover the regions since visited by Mr. W. W. Brown in the interest of Mr. Bangs, and by Mr. Smith's collectors in the interest of this Museum.

This region, for the obvious reasons already quoted from Salvin and Godman, has of late presented strong attractions to a number of American naturalists, and for nearly a year before Mr. Smith's departure he had been preparing to thoroughly explore the Santa Marta district of Colombia, both zoologically and botanically, beginning at sea-level and later working up to the highest points of the Sierra, it being his intention to devote from three to five years to the work, aided by a number of assistants. By a singular coincidence, Messrs. O. and E. O. Bangs, well-known naturalists of Boston, Mass., were at the same time arranging to send an experienced collector, Mr. W. W. Brown, Jr., to this same region, in absolute ignorance of Mr. Smith's plans, and Mr. Smith and myself were in equal ignorance of the plans of Messrs. Bangs. It happened that Mr. Brown was first on the ground, and his collections began to reach Boston long before any portion of Mr. Smith's were received here. For months after Mr. Smith's

arrival at Santa Marta he was laid up with a nearly fatal illness, and for the last year his work has been almost wholly suspended in consequence of the disturbed condition of the region, due to a violent insurrection in his immediate neighborhood. Although further shipments are expected from Mr. Smith, nothing has been received from him for many months, and it has therefore seemed desirable to place on record the results of his first shipments of birds, numbering, as already stated, nearly 3000 specimens, and to collate them with the published results of other collectors in this limited area, as recorded in the following papers :

- 1879-80. SALVIN, OSBERT, and F. DUCANE GODMAN. On a Collection of Birds from the Sierra Nevada of Santa Marta, Colombia. *Ibis*, 1879, pp. 196-206; 1880, pp. 114-125, 169-178, pll. iii-v.
1879. SIMONS, F. A. A. Notes on the Topography of the Sierra Nevada of Santa Marta, U. S. Colombia. *Proc. Roy. Geogr. Soc.*, I, Nov., 1879, pp. 689-701, with map.
1898. BANGS, OUTRAM. On Some Birds from Santa Marta, Colombia. *Proc. Biol. Soc. Wash.*, XII, pp. 131-144. Jan. 3, 1898.
1898. ———. On Some Birds from Pueblo Viejo, Colombia. *Ibid.*, pp. 157-160. Aug. 10, 1898.
1898. ———. On Some Birds from the Sierra Nevada de Santa Marta, Colombia. *Ibid.*, pp. 171-182. Oct. 31, 1898.
1899. ———. On the Subspecies of *Manacus manacus* (Linn.). *Proc. N. England Zool. Club*, I, pp. 33-37. March 31, 1899.
1899. ———. On Some New or Rare Birds from the Sierra Nevada de Santa Marta, Colombia. *Proc. Biol. Soc. Wash.*, XIII, pp. 91-108. Nov. 11, 1899.
1899. ———. On a Small Collection of Birds from San Sebastian, Colombia. *Proc. N. Engl. Zool. Club*, pp. 75-80. Dec. 27, 1899.
1900. ———. A New Dove from the Sierra Nevada de Santa Marta, Colombia. *Ibid.*, pp. 107-109. May 14, 1900.

Only two collections of birds of any considerable importance appear to have been made in the Santa Marta region of Colombia prior to the Smith collection. The first of these, made by Simons in 1878-79, was reported upon by Salvin and Godman in 1879-80, as above noted, the number of species recorded being 160. (The number of specimens in the collection is not stated.) Apparently two¹ other species were overlooked, or not reported in the Salvin-Godman paper, as shown by the record of the Salvin-

¹ *Doleromyia fallax* (Bourc.) and *Heliochera rubrocristata* (d'Orb. & Lafr.).

Godman collection given *passim* in the various volumes of the 'Catalogue of the Birds in the British Museum,' making a total of 162. Of this number 21 still rest on the authority of the Simons collection, being unrepresented in either the Brown or Smith collections. The following species were described as new :

- | | |
|---------------------------------------|--|
| 1. <i>Campylopterus phainopeplus.</i> | 5. <i>Basileuterus conspicillatus</i> = <i>B. cinereicollis</i> <i>Slater.</i> |
| 2. <i>Ramphomicon dorsale.</i> | 6. <i>Pœcilothraupis melanogenys.</i> |
| 3. <i>Oxygogon cyanolæmus.</i> | 7. <i>Buarremon melanocephalus.</i> |
| 4. <i>Ochthoeca poliogastra.</i> | |

The second is the fine collection of about 2500 specimens made by Mr. Brown for the Bangs Brothers of Boston, in 1897-99, and reported upon by Mr. O. Bangs in the series of papers already cited, and which, it is to be hoped, will be followed by a general paper embodying the collector's field notes. Mr. Bangs appears to have recorded 242 species and subspecies, of which 40, and one genus, were described as new. While many of these new forms were now for the first time made known from the region, others are simply new names for species previously recorded by Salvin and Godman, the large amount of material now available for comparison showing them to be local forms entitled to subspecific recognition. In nearly all cases the abundant material in the Smith collection, in so far as such forms are represented in it, confirms Mr. Bangs's conclusions. As Mr. Brown collected extensively at altitudes above the points Mr. Smith has thus far reached, quite a number of Mr. Bangs's new forms are unrepresented in the Smith collection. The Brown collection contained 121 species not obtained by Simons, raising the number of species definitely known from the Santa Marta region to 283. Of this number 36 rest thus far solely on the authority of the Brown collection. Following is a list of the new forms, with their equivalents in the Salvin-Godman paper, so far as they are there represented :

- | | |
|--|---|
| 1. <i>Neocrex columbianus.</i> | 5. <i>Pharomacrus festatus</i> = <i>P. fulgidens.</i> |
| 2. <i>Geotrygon linearis infusca.</i> | 6. <i>Melanerpes wagleri sanctæ-martæ</i> = <i>Centurus tricolor.</i> |
| 3. <i>Aulacorhamphus lautus</i> = <i>A. albivittatus.</i> | 7. <i>Acestrura astreans</i> = <i>A. mulsanti.</i> |
| 4. <i>Galbula ruficauda pallida</i> = <i>G. ruficauda.</i> | |

- | | |
|--|---|
| 8. <i>Leucuria</i> (gen. nov.) <i>phalerata</i> . | 25. <i>Haplospiza nivarica</i> = <i>Phrygilus unicolor</i> . |
| 9. <i>Metallura districta</i> = <i>M. smaragdinicollis</i> ? | 26. <i>Spinus spinescens capitaneus</i> . |
| 10. <i>Elænea sororia</i> . | 27. <i>Cyanocompsa concreta sanctæ-martæ</i> . |
| 11. <i>Elænea browni</i> . | 28. <i>Buarremon basilicus</i> . |
| 12. <i>Myiopatis montensis</i> . | 29. <i>Piranga faceta</i> . |
| 13. <i>Hapalocercus paulus</i> . | 30. <i>Cyclorhis flavipectus canticus</i> = <i>C. flavipectus</i> . |
| 14. <i>Ochthodiaeta pernix</i> . | 31. <i>Diglossa nocticola</i> . |
| 15. <i>Pipreola auripectus decorus</i> . | 32. <i>Dacnis napæa</i> . |
| 16. <i>Manacus manacus abdivitus</i> = <i>Chiomachæris manacus</i> . | 33. <i>Troglodytes monticola</i> . |
| 17. <i>Dendrocincia olivacea anguina</i> . | 34. <i>Thryothorus lætus</i> . |
| 18. <i>Sclerurus albigularis propinquus</i> . | 35. <i>Henicorhina anchoreta</i> . |
| 19. <i>Automolus rufipectus</i> . | 36. <i>Cinclus rivularis</i> . |
| 20. <i>Grallaria spiator</i> . | 37. <i>Merula incompta</i> . |
| 21. <i>Conopophaga browni</i> . | 38. <i>Merula albiventris fusa</i> . |
| 22. <i>Scytalopus latebricola</i> . | 39. <i>Merula gigas caczela</i> = <i>Turdus gigas</i> . |
| 23. <i>Arremonops canescens</i> = <i>Embernagra conirostris</i> . | 40. <i>Merula phæopygia minuscula</i> . |
| 24. <i>Sycalis browni</i> . | |

The Smith collection, forming the basis of the present paper, contained nearly 3000 specimens, representing 304 species, and adding 105 to the list of positively known Santa Marta birds, which now numbers 388 species. Thus all but 84 of the 388 species are represented in the Smith collection, which also includes, as just said, 105 not previously recorded. In the course of the present paper the following species are described as new, namely :

- | | |
|---------------------------------|-----------------------------------|
| <i>Odontophorus atrifrons</i> . | <i>Attila parvirostris</i> . |
| <i>Myiobius assimilis</i> . | <i>Attila rufipectus</i> . |
| <i>Ochthoeca jesupi</i> . | <i>Myiotherula sanctæ-martæ</i> . |
| <i>Ochthoeca olivacea</i> . | <i>Hylophilus brunneus</i> . |

The Simons and Brown collections were both made in large part in the higher portions of the Sierra Nevada, while much of the Smith collection was gathered near the coast, only a small amount of collecting being done at altitudes above 5000 to 8000 feet. This sufficiently accounts for the absence from the Smith collection of a number of species obtained by Simons and Brown in the higher parts of the Sierra.

As will be seen from the list of species given below, very few water birds have been obtained from the Santa Marta district, neither Simons nor Brown collecting along the coast, and appar-

ently a week in September, 1898, covers the whole time spent by Mr. Smith's collectors on or near the seashore at Cienaga.

While to Mr. Smith is due the credit of organizing and equipping the Expedition and directing its work, he has personally done very little of the actual work of bird collecting, which has been carried on by Mrs. Smith, so well known for her previous work on similar expeditions in Southern Brazil, Mexico, and the lesser Antilles, and who, with Mr. G. H. Hull, appears to have secured and prepared the principal part of the collection of birds. Their further work in the Santa Marta region, if they are not driven out by the disturbed condition of the country, will probably add many more species to the list of Santa Marta birds.

In respect to the faunal relationships of the Santa Marta region, it may be said that while many wide-ranging species common to a large part of tropical America are found here, many of them are represented by geographical forms peculiar to this region, while in the higher parts of the Sierra Nevada occur many distinct species quite unlike their nearest congeners found elsewhere, and belonging for the most part to genera not found in the adjoining low coast region, but which occur in the Cordillera regions of other parts of northern South America. Also it may be noted that many of the species of the list which are abundant at the lower levels, are not recorded from points above 5000 to 6000 feet.

It is further evident that the avifauna of the Bogota region is very different from that of the Santa Marta district, and that also the home of many 'Colombia' species is to be looked for elsewhere than in eastern Colombia. Indeed, a very different set of birds was met with by Wyatt¹ in "the eastern Cordillera of the State of Santander," in the Bucaramanga district, midway between Santa Marta and Bogota.

Unfortunately no field notes are as yet available for publication, but the number of specimens taken of the different species, as here recorded, doubtless indicates to some extent the relative abundance of the species; while the dates, especially for North American migrants, indicate the season of occurrence.

I am indebted to Mr. Bangs for sending me for examination

¹ Notes on Some of the Birds of the United States of Colombia. By Claude W. Wyatt. *Ibis*, 1871, pp. 113-131, 319-335, 373-384. An annotated list of 210 species.

his large series of *Elanea browni* and *E. sororia*, and to Mr. Ridgway for the loan of material for comparison in several of the more difficult groups, and for his opinion on a few species sent to him for examination, as noted below. I am also indebted to Mr. Herbert H. Smith for the use of several hundred duplicates from the Santa Marta collection of birds, the whole collection sent by him to New York having been utilized in the preparation of the present paper. The number of specimens recorded under the different species thus includes the whole number sent.

The principal localities, with their approximate altitudes, visited by Simons and Brown, and by Smith's collectors, are for convenience of reference here listed in alphabetical sequence :

Agua Dulce, coast region, near Santa Marta.

Arehueca, near coast, 3 m. south of Cienaga.

Atanques, alt. 2800 ft. (Simons); 4000 ft. (Salv. & Godm.); about 10 m. north of Valle Dupar.

Bonda, alt. 150-250 ft., on Rio Manzanares, 10 m. east of Santa Marta.

Cacagualito, coast region, alt. 1500 ft.

Chinchicua, Valley of, in Sierra Nevada, alt. 6500 ft.

Chinchicua, Pass of, alt. 11,000 ft.

Chirua, in Sierra Nevada, alt. 4000 ft., Salv. & Godm.; 7000 ft., Bangs.

Chiruqua, Paramo de, or Pass of, 11,000-15,000 ft.

Concha, coast region, near Santa Marta.

Cienaga, coast, 20 m. south of Santa Marta.

El Libano, Sierra Nevada, alt. 6000 ft.

El Lorenzo, Sierra Nevada, alt. 7000-7500 ft.

El Mamon, Sierra Nevada, alt. 8000 ft.

Guallabol, alt. 3000 ft.

Jordan, coast, near Santa Marta.

La Concepcion, alt. 3000 ft.

Las Nubes, Sierra Nevada, alt. 5000 ft.

Macotama, alt. 8000 ft. (Bangs).

Macotama, Paramo de, or Pass of, 11,000-15,000 ft.

Mamatoco, near sea-level, 10 m. from Santa Marta.

Manaure, alt. 2700 ft., 20 m. S. E. of Valle Dupar, at base of western slope of Cordillera de los Andes.

Marocaso, alt. 2000 ft., on Rio Rancheria, southern slope of the Sierra Nevada.

Masinga Vieja, alt. 300 ft., on the Rio Manzanares, about 6 m. east of Bonda.

Minca (misspelled Minea by Simons and by Salvin & Godman), alt. 2000 ft., about 15 m. from the coast at head of Rio Gairu.

Naranjo, near coast, alt. 500 ft.

Onaca, near coast, alt. 2500 ft.

Palomina, in Sierra Nevada, alt. 5000 ft.

Paramo, see Chiriqua and Macotama.

Pueblo Viejo, Sierra Nevada, near San Sebastián, alt. 8000 ft.

Quebra Concha, see Concha.

Quebra Mojoba, near coast.

San Francisco, Sierra Nevada, alt. 6000 ft.

San José, Sierra Nevada, alt. 5000 ft.

San Lorenzo, Sierra Nevada, alt. 7500 ft.

San Miguel, Sierra Nevada, alt. 7500 ft.

San Sebastian, Sierra Nevada, alt. 6700 ft.

Santa Cruz, Sierra Nevada, alt. 8000 ft.

Santa Marta, coast, alt. 500 ft. Mr. Brown's collections from this point were made at altitudes of "from 500 to 1500 ft." (*Cf.* Bangs, *Proc. Biol. Soc. Wash.*, XII, 1898, p. 131.)

Tayanga, coast, about 2 m. north of Santa Marta.

Valencia, alt. ———.

Valparaiso, Sierra Nevada, alt. 4500–5500 ft.

Valle Dupar, on a plain, south of the Sierra Nevada, near the mouth of the Rio Guatapuri.

1. *Crypturus soui* (*Hermann.*)¹

Crypturus pileatus BANGS, *Proc. Biol. Soc. Wash.* XII, 1898, 132. Santa Marta.

Two specimens: Minca, Jan. 19; Bonda, April 6.

2. *Crypturus columbianus* *Salvadori.*

Crypturus columbianus BANGS, *Proc. Biol. Soc. Wash.* XII, 1898, 131. Santa Marta.

One specimen, Bonda, Nov. 14.

3. *Tinamus ruficeps* *ScL. & Salv.*

One specimen, Cacagualito, May 18.

4. *Phalacrocorax vigua* (*Vieill.*)

One specimen, Bonda, November.

5. *Cancroma cochlearia* *Linn.*

Two specimens, Minca, ♂ ad., June 29; Bonda, juv., March 21.

¹ = *Crypturus pileatus* (Bodd.) auct. *Cf.* Richmond, *Auk*, XVII, April, 1900, p. 179.

6. *Nycticorax nycticorax nævius* (Bodd.).

One specimen, ♂ ad., Bonda, June 10.

7. *Tigrisoma salmoni* Schl. & Salv.

Tigrisoma salmoni SALV. & GODM. Ibis, 1880, 178. Minca.

One specimen, Valparaiso, April 20.

8. *Butorides striata* (Linn.).

Butorides cyanurus SALV. & GODM. Ibis, 1879, 206 (no locality stated).

One specimen, Bonda, April 7.

9. *Butorides virescens* (Linn.).

One specimen, Bonda, October.

10. *Agamia agami* (Gmel.).

Ardea agami SALV. & GODM. Ibis, 1880, 178. Minca.

Two specimens: Mamatoca, ♂ ad., July 11; Bonda, juv., Dec. 9.

11. [*Porzana albigularis* Lawr.

Porzana albigularis BANGS, Proc. Biol. Soc. Wash. XII, 157, 172. Pueblo Viejo and Palomina.]

12. [*Neocrex colombianus* Bangs.

Neocrex colombianus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 171. Palomina, one specimen.]

13. *Aramides cajanus* (Müller).

One specimen, Minca, July 6.

14. [*Aramides axillaris* Lawr.

Aramides axillaris BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. Chirua.]

15. *Tryngites subruficollis* (Vieill.).

Two specimens, Cienaga, Sept. 12 and 17.

16. *Bartramia longicauda* (Bechst.).

One specimen, Cienaga, Sept. 15.

17. *Actitis macularia* (Linn.).

Actitis macularia BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. La Concepcion, March 23.

Three specimens, Cienaga, Sept. 13 and 14.

18. *Totanus solitarius* (Wils.).

Rhyacophilus solitarius SALV. & GODM. Ibis, 1880, 178. Santa Marta.

Three specimens, Cienaga, Sept. 10-12.

19. *Totanus flavipes* (Gmel.).

One specimen, Cienaga, Sept. 12.

20. *Micropalama himantopus* (Bonap.).

One specimen, Cienaga, Sept. 13.

21. *Tringa maculata* (Vieill.).

One specimen, Cienaga, Sept. 14.

22. *Tringa minutilla* (Vieill.).

Eight specimens, Cienaga, Sept. 10-14.

23. *Ereunetes pusillus* (Linn.).

Two specimens, Cienaga, Sept. 12.

24. *Ægialitis collaris* (Vieill.).

Two specimens, Cienaga, Sept. 10 and 13.

25. *Jacana nigra* (Gmel.).

One specimen, Cienaga, Sept. 13.

26. *Ortalis garrula* (Humb.).

One specimen, Bonda, Nov. 5.

27. *Chamæpetes goudoti* (Lesson).

Fourteen specimens: El Libano, 13 specimens, April 21-29, and May 4-20; Valparaiso, 1 specimen, April 17.

28. *Penelope argyrotis* (Bonap.).

Penelope argyrotis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Three specimens, El Libano, April 24 and May 11 and 19.

29. *Penelope cristata* (Linn.).

One specimen, Bonda, Dec. 7.



30. *Crax alberti* Fraser.

Crax alberti BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Three specimens, 1 adult and 2 chicks, Bonda, July 21 and 26, and Naranjo, July.

Young birds in first plumage show little resemblance to the adults, and may be thus described :

Frontlet and broad superciliaries dark rufous, with a similar line running from the angle of the mouth beneath the ear-coverts, which are deep buffy ; top of the head blackish with a median and a broad lateral stripe on each side gray, the gray occupying only the tips of the feathers ; nape blackish, more or less rufous on the median line ; back mixed chestnut and blackish with many buffy-tipped feathers on the anterior portion, and posteriorly a broad white band on each side passes from the middle of the dorsal region to the base of the tail ; tail black, tipped and varied with pale rufous ; wings with the lesser coverts uniform rusty brown, the middle and greater coverts black broadly edged with rufous ; quills black, the primaries broadly edged with rufous, the secondaries conspicuously barred with rufous ; chin, throat, abdomen and thighs buffy white ; breast dark ferruginous on the sides but lighter on the middle line ; bill and feet flesh color. The only resemblance to the adult is the color pattern of the wings, in which the narrow white crossbars in the adult are replaced by broader rufous bars in the young.

31. *Eupsychortyx leucopogon* (Lesson).

Three specimens, Bonda, Jan. 5, Aug. 27, and Oct. 6.

32. *Odontophorus atrifrons*, sp. nov.

Type (and only specimen), No. 73246, ♂. ad., Valparaiso, March 25, 1899 ; coll. H. H. Smith.

Forehead, chin, throat, cheeks and ear-coverts uniform deep black ; whole top of head and crest dark chestnut brown, passing into rufous on the sides of the ear-coverts ; mantle olivaceous gray vermiculated with black ; scapulars with the inner vanes black broadly barred and edged with chestnut, with light shaft-stripes, and central portion of outer vane gray ; lower back olivaceous brown, the rump and upper tail-coverts similar but darker, with a few blotches of black at the tips of some of the feathers ; tail dark brown, indistinctly barred with blackish and freckled with rusty ; wings dark brown, the secondaries freckled and indistinctly barred with rusty, the primaries with broad distinct bars of pale rufous on the outer vanes ; upper breast similar to the mantle, but varied slightly with buffy white, which takes the form of ill-defined apical spots on the lower border of this area ; lower breast ochraceous rufous with indistinct crossbars and shaft-stripes of black ; flanks buffy olivaceous brown, with black crossbars ; lower tail-coverts black barred and tipped with rufous ; bill deep black ; feet dusky horn color. Wing, 130 ; tail, 87 ; tarsus, 44 ; culmen, 17 mm.

This species is readily distinguished by its wholly black forehead, throat and sides of the head, which are without any trace of whitish shaft-lines or other markings.

33. *Geotrygon montana* (Linn.).

One specimen, Bonda, June.

34. *Geotrygon linearis infusca* Bangs.

Geotrygon linearis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 157. Pueblo Viejo.

Geotrygon linearis infusca BANGS, Proc. N. Engl. Zool. Club, I, 108, May 14, 1900. Chirua and La Concepcion.

Seven specimens, 5 adult and 2 juv. (nestlings): Valparaiso, 2 (juv.), May 24 and 25; El Libano, 4 specimens, April 22; San Lorenzo, 1 specimen, May 10.

35. *Leptotila verreauxi* Bonap.

Leptotila verreauxi SALV. & GODM. Ibis, 1880, 178. Minca.

Leptotila verreauxi BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Ten specimens, all from Bonda, taken June —, July 13, Aug. 3, 5 and 16, Oct. 4, Nov. 8 and 21, and Dec. 5.

36. *Claravis pretiosa* (Ferrari-Perez).¹

Four specimens: Minca, Jan. 19; Cacagualito, May 13; Matatoca (no date).

37. *Columbigallina passerina granatina* (Bonap.).

Columbigallina passerina pallescens BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Eight specimens, all from Bonda, taken Jan. —, Feb. 23, July 11, Aug. 27, Sept. 13, Oct. 27, and Dec. 1.

38. *Columbigallina rufipennis* (Bonap.).

Chamaepelia rufipennis SALV. & GODM. Ibis, 1880, 178. Santa Marta.

Columbigallina rufipennis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Seventeen specimens: Bonda, 15 specimens, Jan. 10, June 25, July 5, Aug. 5 and 16, Oct. 7, Nov. 4-12; Masinga Vieja, 1 specimen, Sept. 7; Cienaga, Sept. 13.

¹ = *Peristera cinerea* (Temm.) auct.; cf. Oberholser, Proc. Acad. Nat. Sci. Phila., 1899, p. 203.

39. [Scardafella squamosa (Temm.).

Sardafella [sic] *squamosa* SALV. & GODM. Ibis, 1880, 178. Valencia.]

40. Columba speciosa Gmel.

Five specimens, Bonda, Jan. 13, June 6, July 7, Dec. 8.

41. Columba albilineata Gray.

Columba albilineata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 172 (Palmolina); *ibid.* Proc. N. Engl. Zool. Club. I, 1899, 75 (San Sebastian and El Mamon).

One specimen, Valparaiso, April 16.

42. Columba gymnophthalma Temm.

One specimen, ♂ juv., Tayanga, June 22, is referred provisionally to this species. Probably more material would show that the mainland form is separable from true *C. gymnophthalma*.

43. Columba rufigula (Temm.).

One specimen, Bonda, Aug. 1.

44. [Cathartes aura (Linn.).

Cathartes aura SALV. & GODM. Ibis, 1880, 178. Santa Marta.]

45. Gypagus papa (Linn.).

Gypagus papa BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. El Paramo de Macotama, Chirua, and La Concepcion.

One specimen, Bonda, Aug. 19.

46. Asturina nitida (Lath.).

Four specimens, Bonda, June —, July 22, Aug. 16 and 17 — 3 adults and 1 juv.

47. Rupornis magnirostris (Gmel.).

Asturina magnirostris SALV. & GODM. Ibis, 1880, 176. Santa Marta and Minca.

Rupornis magnirostris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Two specimens, Bonda, April 2 and Nov. 13.

48. Rupornis leucorrhoa (Quoy & Gaim.).

One specimen, ♂ ad., El Libano, May 23. Identified by Mr. Ridgway.

August, 1900.]

49. *Buteo latissimus* (Wilson).

Buteo pennsylvanicus SALV. & GODM. Ibis, 1880, 177. Minca, Jan. 17 and 22.

Buteo latissimus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta, winter.

Seven specimens : Bonda, Feb. 9, March 26, Nov. 13-20, Dec. 22 ; Valparaiso, March 21.

50. *Busarellus nigricollis* (Lath.).

Two specimens, Bonda, March 8 and 29.

51. *Urubitinga zonura* (Shaw).

Three specimens, Bonda, March 11, May 26, and June 27.

52. *Urubitinga anthracina* (Nitzsch).

Urubitinga anthracina SALV. & GODM. Ibis, 1880, 177. Santa Marta.

Four specimens, Bonda, May 25, June 29, Aug. 23, and Sept. 1.

53. *Geranoëtus melanoleucus* (Vieill.).

One specimen, Agua Dulce, April 26.

54. *Lophotriorchis isidorii* (Des Murs).

One specimen, ♀ ad., Bonda, May 27.

55. *Accipiter bicolor* (Vieill.).

Four specimens : Bonda, May 17, Aug. 20, and Dec. — ; Onaca, Jan. 7.

56. *Accipiter tinus* (Lath.).

One specimen, Las Nubes, Dec. 19.

57. *Micrastur semitorquatus* (Vieill.).

Micrastur semitorquatus SALV. & GODM. Ibis, 1880, 177 (Valencia) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132 (Santa Marta).

Two specimens, Bonda, April 3 and Sept. 10.

58. *Micrastur ruficollis* (Vieill.).

Two specimens, Valparaiso, March 17 ; El Libano, April 29.

59. *Geranospizias cærulescens* (Vieill.).

One specimen, Bonda, April 2.

60. *Falco ruficularis* (Daud.).

Falco ruficularis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. La Concepcion.

One specimen, Minca, June 20.

61. [*Tinnunculus sparverius* (Linn.).

Tinnunculus sparverius SALV. & GODM. Ibis, 1879, 206; 1880, 177 (Manauare and Valencia, May and June); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 172 (Palomina and San Miguel).]

62. *Gampsonyx swainsoni* Vigors.

Two specimens, Bonda, Feb. 14 and Dec. 1.

63. *Rostrhamus sociabilis* (Vieill.).

One specimen, Bonda, Aug. 22.

64. *Leptodon cayanensis* (Gmel.).

One specimen, Masinga, Aug. 21.

65. *Leptodon uncinatus* (Temm.).

Two specimens, Bonda, June 20.

66. *Ictinea plumbea* (Vieill.).

Ictinea plumbea SALV. & GODM. Ibis, 1879, 200. Manauare.

One specimen, Valparaiso, June 6.

67. *Herpetotheres cachinnans* (Linn.).

Two specimens, Bonda, June 14 and Nov. 28.

68. [*Milvago chimachima* (Vieill.).

Milvago chimachima SALV. & GODM. Ibis, 1880, 177. Valencia.]

69. *Polyborus cheriway* (Jacq.).

Polyborus cheriway SALV. & GODM. Ibis, 1880, 177. Valencia.

Five specimens, Bonda, Jan. 11, July 26, Aug. 23, Nov. 19.

70. *Syrnium perspicillatum* (Latham).

Syrnium perspicillatum BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Three specimens, Bonda, Jan. 7, May —, and Aug. 29. The August specimen is still partly in nestling plumage, the whole

head, nape, throat (not the chin) and upper breast being in the white downy plumage of the young bird.

71. [*Syrnium virgatum* Cassin.]

Syrnium virgatum BANGS, Proc. Biol. Soc. Wash. XII, 1898, 157. Santa Marta,—“one female just emerging from immature plumage, March 21, 1898.”]

72. *Glaucidium ferox* (Vieill.).

Six specimens, Bonda, Jan. 11 and 18, Aug. 18, Oct. 13, and Nov. 30.

73. *Pionus sordidus* (Linn.).

Pionus sordidus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133, 172 (Santa Marta and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 75 (San Sebastian).

Two specimens, Valparaiso, April 6 and 7.

74. *Pionus menstruus* (Linn.).

Pionus menstruus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Three specimens, Bonda, June 27, and Aug. 3 and 15.

75. [*Amazona amazonica* (Linn.).

Chrysotis amazonica SALV. & GODM. Ibis, 1880, 176. Arihueca.]

76. [*Amazona mercenaria* (Tsch.).

Amazona mercenaria BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. “Two males, from Paramo de Chiruqua, 11,000 feet.”]

77. *Brotogerys jugularis* (Müller).

Brotogerys tovi SALV. & GODM. Ibis, 1880, 176. Santa Marta.

Brotogerys jugularis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132. Santa Marta.

Thirty-three specimens, all from Bonda, collected Jan. 11, May 10, June 23-30, July 2 and 25-27, Aug. 8, 13 and 23, and Oct. 7.

78. [*Psittacula guianensis* (Swains.).

Psittacula cyanoptera SALV. & GODM. Ibis, 1880, 176. Valle Dupar and Valencia.

79. *Conurus wagleri* Gray.

Conurus wagleri SALV. & GODM. Ibis, 1879, 206 (Atanques); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 172 (Palomina and San Miguel).

One specimen, Valparaiso, March 23.

80. [*Ara chloroptera* Gray.

Ara chloroptera SALV. & GODM. Ibis, 1880, 176 (Valle Dupa); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132 (Santa Marta).]

81. [*Ara militaris* (Linn.).

Ara militaris SALV. & GODM. Ibis, 1880, 176 (Arihueca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 132 (Santa Marta).

One specimen, Bonda, Aug. 11.

82. *Aulacorhamphus lautus* Bangs.

Aulacorhamphus albivittatus SALV. & GODM. Ibis, 1879, 206. Chinchica, altitude 6500 feet.

Aulacorhamphus lautus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 173 (San Miguel); *ibid.* XIII, 1899, 92 (Chirua and La Concepcion).

Nineteen specimens, collected as follows: Valparaiso, 3 specimens, March 23 and April 12 and 13; San Lorenzo, 1 specimen, May 14; El Libano, 6 specimens, April 25, May 3, 6 and 20, and June 16; Las Nubes, 9 specimens, Dec. 8-14.

83. *Aulacorhamphus calorhynchus* Gould.

Aulacorhamphus calorhynchus SALV. & GODM. Ibis, 1879, 206 (Chinchica); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134, 158, 172 (Santa Marta, Pueblo Viejo and Palomina).

Fifteen specimens, all from Valparaiso, March and April.

84. *Pteroglossus torquatus* (Gmel.).

Pteroglossus torquatus SALV. & GODM. Ibis, 1880, 175 (Santa Marta and Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134 (Santa Marta).

Three specimens, Bonda, Sept. 2, Nov. 1, and Dec. 16.

85. [*Rhamphastos brevicarinatus* Gould.

Rhamphastos tocard SALV. & GODM. Ibis, 1879, 206. Manaure.

Rhamphastos brevicarinatus SCLATER, Cat. Bds. Brit. Mus. XIX, 1891, 126 (includes the Manaure specimen recorded by Salvin & Godman, *l. c.*); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134, 157 (Santa Marta and Pueblo Viejo).

Two specimens: Bonda, November; Cacagualito, May 14.

[*Rhamphastos carinatus* Swainson.

Rhamphastos carinatus SALV. & GODM. Ibis, 1879, 206. "Manaure (2700 ft.), ♂, 18th May. . . . This is the first South American specimen I have seen, the range of the species being hitherto supposed to be restricted to Central America."

It is to be noted that no specimen of this species is recorded by Sclater (Cat. Bds. Brit. Mus. XIX, 1891, 126, 127) from south of Nicaragua, and only one specimen is recorded under *R. brevicarinatus* from Colombia. It therefore seems probable that the record of *R. carinatus* for Manaure, Santa Marta, U. S. Colombia, was made in error.]

86. *Coccyzus americanus* (Linn.).

Nine specimens, Bonda, Oct. 27 and 31, Nov. 8, 17 and 21.

87. *Coccyzus melanocoryphus* Vieill.

One specimen, Bonda, Aug. 7.

88. *Coccyzus landsbergi* Bonap.

One specimen, Cienaga, September.

89. *Piaya cayana mehleri* (Bonap.).

Piaya cayana SALV. & GODM. Ibis, 1879, 206. Valle Dupar.

Piaya cayana mehleri BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta); *ibid.* Proc. N. Eng. Zool. Club, I, 1899, 76 (San Sebastian).

Nine specimens, all from Bonda, collected as follows: Jan. 13 and 24, Feb. 8, 22 and 24, Aug. 11, 18 and 22, and Sept. 5.

90. *Crotophaga sulcirostris* Swainson.

Crotophaga sulcirostris SALV. & GODM. Ibis, 1880, 175 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

Eleven specimens: Santa Marta, 2 specimens, July 12 and 21; Bonda, Aug. 2, 3, 5 and 23, and Nov. 19. The last two are half-grown fledglings.

91. [*Crotophaga ani* Linn.]

Crotophaga ani BANGS, Proc. Biol. Soc. Wash. XII, 1898, 172 (Palomina, one female).]

92. *Malacoptila mysticalis* Sclater.

Malacoptila mysticalis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

Seven specimens: Onaca, 2 specimens, Dec. 26 and 27; Valparaiso, 3 specimens, April 10 and June 1; Las Nubes, 2 specimens, Nov. 29 and Dec. 21.

93. *Bucco ruficollis* (Wagler).

Bucco ruficollis SALV. & GODM. Ibis, 1879, 205 ; 1880, 175 (Valle Dupar and Santa Marta) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

Thirty-seven specimens, taken as follows : Santa Marta, 3 specimens, July 10 and 13 ; Bonda, 34 specimens, Jan. 17-31, Feb. 10-17, June 27 and 28, July 12-26, Aug. 21-30, Sept. 2-8, Oct. 7, Nov. 5, 8 and 21, Dec. 27.

94. *Galbula ruficauda pallida* Bangs.

Galbula ruficauda SALV. & GODM. Ibis, 1879, 205 ; 1880, 175. Santa Marta and Valle Dupar.

Galbula ruficauda pallida BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133. Santa Marta.

Nine specimens : Cienaga, 1 specimen, September ; Bonda, 8 specimens, June 28, Aug. 17 and 29, Oct. 6, Nov. 17 and 29.

95. *Pharomacrus festatus* Bangs.

Pharomacrus fulgidens SALV. & GODM. Ibis, 1879, 205. Valley of Chinchicua, 6500 feet.

Pharomacrus festatus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 92. Chirua, altitude 7000 feet.

Three specimens, El Libano, altitude 6000 feet, April 29, May 6 and 18.

96. *Trogon caligatus* Gould.

Trogon caligatus SALV. & GODM. Ibis, 1880, 174. Minca.

Two specimens : Cacagualito, May 26, and Minca, July 27.

97. *Trogon personatus* Gould.

Trogon personatus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 93. Chirua, La Concepcion, and Macotama.

Thirteen specimens : Valparaiso, 7 specimens, March 15-27, April 5, 6 and 19, May 25 ; Las Nubes, 1 specimen, Dec. 6 ; El Libano, April 23-26 and Dec. 14.

98. *Momotus subrufescens* Sclater.

Momotus subrufescens SALV. & GODM. Ibis, 1880, 174 (Santa Marta) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

Twenty-six specimens, all from Bonda, Jan. 2, Feb. 2, 8 and 22, May 11, July 5, 7 and 27, Aug. 3-11 and 23, Oct. 8, Nov. 14-23.

99. *Ceryle torquata* (Linn.).

Ceryle torquata SALV. & GODM. Ibis, 1880, 174 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

One specimen, Bonda, Sept. 8.

100. *Ceryle amazona* (Lath.).

Ceryle amazona BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133. Santa Marta.

Three specimens, Bonda, Feb. 7, July 2, and Aug. 3.

101. *Ceryle americana* (Gmel.).

Ceryle americana SALV. & GODM. Ibis, 1880, 174 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 133 (Santa Marta).

Fifteen specimens: Bonda, 12 specimens, Jan. 12, Feb. 4 and 22, June 28, July 10, Aug. 3 and 4, Sept. 1, Oct. 13, Nov. 15; Cienaga, 3 specimens, Sept. 13-15.

102. *Melanerpes wagleri sanctæ martæ* Bangs.

Centurus tricolor SALV. & GODM. Ibis, 1879, 205; 1880, 174. Santa Marta and Valle Dupar.

Melanerpes wagleri sanctæ-martæ BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134. Santa Marta.

Twenty-five specimens: Santa Marta, 1 specimen, July 12; Bonda, 24 specimens, Jan. 17, Feb. 17, June 21-30, July 5, Aug. 3-21, Oct. 7-11, Nov. 17.

103. *Chrysoptilus guttatus* (Spix).

One specimen, Cienaga, Sept. 15.

104. *Chloronerpes yucatanensis uropygialis* (Cab.).

Chloronerpes yucatanensis uropygialis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 93 (La Concepcion and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 76 (San Sebastian).

Five specimens, Valparaiso, March 18, April 8, 14 and 19, and June 11.

105. *Ceophlæus lineatus* (Linn.).

Ceophlæus lineatus BANGS, Proc. Biol. Soc. Wash. 1898, XII, 144. Santa Marta.

Two specimens: Minca, June 24, and Valparaiso, May 31.

106. *Campephilus malherbii* Gray.

Campephilus malherbii SALV. & GODM. Ibis, 1879, 205 (Atanques); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134 (Santa Marta).

Seven specimens: Bonda, June, August and October; Valparaíso, March 17 and May 25; El Libano, May 3.

107. *Picumnus cinnamomeus* Wagler.

Two specimens, Bonda, Oct. 1.

108. *Steatornis caripensis* Humb.

One specimen, Bonda, Sept. —

109. *Nyctidromus albicollis* (Gmel.).

Nyctidromus albicollis SALV. & GODM. Ibis, 1880, 174 (Arihueca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 (Santa Marta).

Eight specimens: Santa Marta, 1 specimen, July 14; Bonda, 7 specimens, Jan. 11, Aug. 28, Nov. 4 and 11.

110. [*Antrostomus rufus* (Bodd.).

Antrostomus rufus BANGS, Proc. N. Engl. Zool. Club, I, 1899, 78. San Sebastian, one specimen.]

111. *Chætura spinicauda* (Temm.).

One specimen, Cacagualito, May 11.

112. [*Hemiprocne zonaris* (Shaw).

Hemiprocne zonaris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158. Santa Marta, one specimen.]

113. *Acestrura astreans* Bangs.

Acestrura mulsanti SALV. & GODM. Ibis, 1879, 205. Atanques, 2700 feet. One specimen, ♀ ad.

Mr. Bangs (*l. c.*) thinks this may be the same as his *A. astreans*, which is quite probable.

Acestrura astreans BANGS, Proc. N. Engl. Zool. Club, I, 1899, 76. San Sebastian and El Mamon, 6600 to 8000 feet.

Three specimens, all females or immature males, Valparaíso, June 12 and 14, and Bonda, Sept. 27.

114. [*Rhamphomicron dorsale* Salv. & Godm.

Rhamphomicron dorsale SALV. & GODM. Ibis, 1880, 172, pl. v (Sierra Nevada, 2000 to 9000 feet); BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 94 (Paramo de Chiriqua, altitude 15,000 feet).]

115. [*Oxypogon cyanolæmus* Salv. & Godm.

Oxypogon cyanolæmus SALV. & GODM. Ibis, 1880, 172, pl. iv, fig. 2. Sierra Nevada, 10,000 to 14,000 feet.]

116. *Florisuga mellivora* (Linn.).

Mellisuga mellivora SALV. & GODM. Ibis, 1880, 172 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 (Santa Marta).

Three specimens: Bonda, Sept. 23 and Oct. 24; Cacagualito, May 14.

117. [*Lafresnaya gayi* (Bourc. & Muls.).

Lafresnaya gayi SALVIN, Cat. Bds. Brit. Mus. XVI, 1892, 329 (San José); BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 94 (Macotama, San Miguel, and Paramo de Chiruqua).]

118. [*Campylopterus phainopeplus* Salv. & Godm.

Campylopterus phainopeplus SALV. & GODM. Ibis, 1879, 202 (San José and Atanques, altitude 4000-5000 feet); *ibid.* 1880, 171, pl. iv, fig. 1 (San Sebastian, altitude 6700 feet)].

119. [*Pygmornis striigularis* (Gould).

Pygmornis striigularis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 93. La Concepcion.]

120. [*Phaëthornis anthophilus* (Bourc. & Muls.).

Phaëthornis anthophilus SALV. & GODM. Ibis, 1880, 171 (Valle Dupar and Valencia); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 (Santa Marta).]

121. *Phaëthornis longirostris* (Less. & Delattr.).

Phaëthornis longirostris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134. Santa Marta.

Six specimens: Cacagualito, May 18 and 20; Las Nubes, Dec. 22 and 23.

122. *Hylocharis cyanea* (Vieill.).

Hylocharis cyanea BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Six specimens: Bonda, Feb. 10, June 25, July 28, Oct. 8; Cacagualito, May 18; Jordan, May 11.

123. *Floricola longirostris* (Vieill.).

Floricola longirostris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Four specimens: Bonda, Feb. 21; Cacagualito, May 14, 21 and 27.

124. *Leucuria phalerata* Bangs.

Leucuria phalerata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 174 (Macotama, one specimen; altitude 8000 feet); *ibid.* XIII, 1899, 93 (Paramo de Macotama, one specimen; altitude 15,000 feet).

Five specimens: El Libano, altitude 6000 feet, April 25, May 12-14.

Two specimens have the tail wholly pure white; the other three have the apical fourth of the tail blackish.

125. *Helianthea*, sp.

Two specimens, El Libano, April 27 and May 5, kindly identified by Mr. Ridgway as "females of some species of *Helianthea*."

126. *Amizillis*¹ *warszewiezi* (Cab. & Hein.).

Saucerottia warszewiezi SALV. & GODM. Ibis, 1880, 173. Santa Marta and Minca.

Amazilia warszewiezi BANGS, Proc. Biol. Soc. Wash. XII, 135 (Santa Marta); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 78 (San Sebastian).

Twenty-two specimens, all from Bonda and immediate vicinity, taken as follows: Bonda, Jan. 5 and 20-25, June 25-27, July 2-7, Aug. 3-30, Sept. 5-7, Oct. 11 and 24, Nov. 11-16; Minca, July 25-27; Cacagualito, May 20.

127. *Amizillis fuscicaudata* (Frazer).

Amazilia fuscicaudata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Seven specimens: Bonda, Oct. 9 and Nov. 14; Cacagualito, May 7, 16, 20, 21 and 27.

128. *Amizillis*, sp.

One specimen, Bonda, Aug. 16.

¹ Cf. Oberholser, Proc. Acad. Nat. Sci. Phila., 1899, p. 207.

129. [*Doleromyia fallax* (Bourc.).

Doleromyia fallax SALVIN, Cat. Bds. Brit. Mus. XVI, 1892, 177.

Two specimens are recorded from "Northern Colombia (*F. Simons*)," but the species is not included in Salvin & Godman's 'Ibis' papers on Mr. Simons's collection.]

130. *Anthocephala floriceps* (Gould).

Anthocephala floriceps BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 (Pueblo Viejo); *ibid.* XIII, 1899, 94 (Pueblo Viejo, Santa Cruz, La Concepcion, San Francisco, and Chirua).

One specimen, Valparaiso, April 6.

131. *Metallura districta* Bangs.

Metallura smaragdini collis? SALV. & GODM. Ibis, 1879, 205 (Valley of Chinchicua, one specimen, ♂ juv.); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 194 (Palomina and San Miguel, two females).

Metallura districta BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 94. Pueblo Viejo, La Concepcion, San Miguel, Paramo de Macotama, and Paramo de Chiruqua.

Thirteen specimens: El Libano, 12 specimens, April 22-27, and May 1-12; Valparaiso, 1 specimen, March 7.

132. *Chrysolampis moschitus* (Linn.).

Twelve specimens, Bonda, June 24-28, July 1, 11 and 14.

133. *Petasophora delphinæ* (Less.).

Petasophora delphinæ SALV. & GODM. Ibis, 1880, 173 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 (Santa Marta).

Seven specimens, Bonda, Sept. 23-27.

134. *Petasophora cyanotis* (Bourc. & Muls.).

Petasophora cyanotis SALV. & GODM. Ibis, 1880, 173 (Minca and San Sebastian); BANGS, Proc. N. Engl. Zool. Club, I, 1899, 76 (San Sebastian and El Mamon).

Two specimens: Valparaiso, March 8; El Libano, April 25.

135. [*Petasophora iolata* Gould.

Petasophora anais SALV. & GODM. Ibis, 1880, 173 (San Sebastian and Sierra Nevada, 9200-10,000 ft.).

Petasophora iolata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 173 (Macotama and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 76 (San Sebastian and El Mamon).]

136. *Lampornis violicauda* (Bodd.).

Lampornis violicauda BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Eight specimens : Bonda, 5 specimens, Jan. 23 and 25, Feb. 23, Aug. 23, and Nov. 14 ; Cacagualito, May 16 ; Masinga, Nov. 15.

137. *Hypuroptila buffoni* (Less.).

Chalybura buffoni SALV. & GODM. Ibis, 1879, 205 (Manaure) ; *ibid.* 1880, 171 (Minca).

Hypuroptila buffoni BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 (Santa Marta).

Forty specimens : Bonda, 11 specimens, Jan. 10, Feb. 9, March 3, July 1, Aug. 12-22, Oct. 10, Nov. 8 and 23 ; Minca, 9 specimens, June 23, July 25-Aug. 3 ; Jordan, 1 specimen, May 11 ; Cacagualito, 18 specimens, May 10-27 ; Valparaiso, 2 specimens, June 8 and 10.

138. *Thalurania columbica* (Bourc.).

Thalurania columbica SALV. & GODM. Ibis, 1880, 172 (Minca and San José) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 and 174 (Santa Marta, San Miguel, and Palomina).

Forty-four specimens : Bonda, 2 specimens, Jan. 1 and Aug. 19 ; Onaca, 4 specimens, Jan. 6 and Dec. 28 and 29 ; Minca, 3 specimens, June 6, July 29, Aug. 4 ; Cacagualito, 1 specimen, May 27 ; Las Nubes, 7 specimens, Dec. 1-21 ; Valparaiso, 15 specimens, March 7, April 5, June 6-July 1 ; El Libano, 9 specimens, April 23-29, May 14.

139. *Panychlora russata* Salv. & Godm.

Panychlora, sp., SALV. & GODM. Ibis, 1879, 205 ; 1880, 174. Manaure and San Sebastian.

Panychlora russata SALV. & GODM. Ibis, 1881, 597 (San Sebastian and San José) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 174 (San Miguel and Palomina) ; *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 76 (San Sebastian and El Mamon).

Two specimens, Bonda, Feb. 2 and July 2.

140. *Chlorostilbon hæberlini* (Reich.).

Chlorostilbon, sp., SALV. & GODM. Ibis, 1880, 174. Valencia, one female.

Four specimens, Bonda, July 8, Aug. 16, Oct. 11, and Nov. —.

141. [*Glaucis hirsuta* (Gmel.).

Glaucis hirsuta BANGS, Proc. Biol. Soc. Wash. XII, 1898, 134. Santa Marta].

142. *Milvulus tyrannus* (Linn.).

Milvulus tyrannus SALV. & GODM. Ibis, 1879, 202 (Manauze and San Sebastian); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 and 176 (Santa Marta and Palomina); *ibid.* Proc. N. Engl. Zool. Club, I, 1900, 71 (San Sebastian).

Fifteen specimens: Bonda, Jan. 23-31, Feb. 4 and 22; Valparaíso, May 29; Cienaga, Sept. 8-14.

143. *Tyrannus melancholicus satrapa* (Licht.).

Tyrannus melancholicus SALV. & GODM. Ibis, 1879, 202. Atanques.

Tyrannus melancholicus satrapa BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 and 176 (Santa Marta, Palomina, and Macotaina); Proc. N. Engl. Zool. Club, I, 1900, 79 (San Sebastian).

Thirty-seven specimens: Bonda, 26 specimens, Jan. 6-Feb. 14, June 23-29, July 6-11, Sept. 1-8, Oct. 11, Nov. 14, Dec. 30; Minca, 4 specimens, June 28, July 5, 24, and Aug. 1; Onaca, 2 specimens, Dec. 31, Jan. 6; Cacagualito, 4 specimens, May 13-29; Valparaíso, 1 specimen, April 15.

144. *Tyrannus griseus* Vieill.

Tyrannus griseus SALV. & GODM. Ibis, 1880, 125. Santa Marta, April 3.

One specimen, Bonda, March 24.

145. [*Tyrannus tyrannus* (Linn.).

Tyrannus pipiri SALV. & GODM. Ibis, 1880, 125. Santa Marta, April 4.]

146. *Myiarchus crinitus* (Linn.).

Myiarchus crinitus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta.

Five specimens, Bonda, Nov. 22, Dec. 5, Jan. 21, Feb. 10 and 27.

147. *Myiarchus ferox* (Gmel.).

Myiarchus tyrannulus SALV. & GODM. Ibis, 1880, 125 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta.

Eight specimens, Bonda, Jan. 10 and 14, Feb. 18 and 22, June 27 and 29, Oct. 6, Nov. 25.

148. *Myiarchus erythrocerus* *Scl. & Salv.*

Myiarchus erythrocerus SALV. & GODM. Ibis, 1880, 125 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 (Santa Marta).

Fifty-five specimens, taken as follows: Bonda, 51 specimens, representing nearly every month of the year; Santa Marta, 3 specimens, July 12-14; Cacagualito, 1 specimen, May 19.

149. *Myiarchus nigriceps* *Sclater.*

Myiarchus nigriceps SALV. & GODM. Ibis, 1879, 125 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137, 158 and 176 (Santa Marta, Pueblo Viejo, Palomina, and Macotama).

Sixteen specimens: Minca, 9 specimens, May 30, June 19, July 26-31, Aug. 4; Onaca, 2 specimens, Dec. 28 and 29; Las Nubes, 1 specimen, Dec. 20; Cacagualito, 4 specimens, May 10, 20 and 28, and June 30; Valparaiso, 2 specimens, April 7 and 10.

150. *Nuttallornis borealis* (*Swains.*).

Contopus borealis SALV. & GODM. Ibis, 1880, 125. Minca.

Nuttallornis borealis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 98. La Concepcion, March 8.

One specimen, San Lorenzo, May 13.

151. *Contopus virens* (*Linn.*).

Contopus virens SALV. & GODM. Ibis, 1880, 125. Santa Marta.

Two specimens: Valparaiso, April 19; Cacagualito, May 10.

152. *Contopus brachytarsus* (*Sclater*).

Contopus brachytarsus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta.

Six specimens: Minca, July 31 and Aug. 3; Cacagualito, May 12, 14 and 17.

153. *Empidonax virescens* (*Vieill.*).

Empidonax virescens BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta, winter.

Four specimens: Bonda, Nov. 16; Onaca, Dec. 28 and Jan. 5; Valparaiso, March 21.

154. *Empidonax ridgwayi* Slater.

Six specimens, Bonda, Aug. 27, Sept. 6-8, Oct. 7-24.

155. *Empidochanes cabanisi* (Léotaud).¹

Five specimens: Concha, Aug. 18; Bonda, Sept. 6, Jan. 20, Feb. 27; Valparaíso, May 16.

156. [*Pyrocephalus rubinus* (Bodd.).

Pyrocephalus rubineus SALV. & GODM. Ibis, 1879, 202 (Valle Dupar); *ibid.* 1880, 125 (Valencia).]

157. *Myiobius erythrurus* Cabanis.

One specimen, Jordan, May 11.

158. *Myiobius assimilis*, sp. nov.

Myiobius vieillotoides SALV. & GODM. Ibis, 1880, 125 (San Sebastian).
Not *M. vieillotoides* Lafr.

Myiobius vieillotoides BANGS, Proc. Biol. Soc. Wash. XII, 1898, 176 (San Francisco). Not *M. vieillotoides* Lafr.

Type, No. 72629, ♂ ad., Valparaíso (altitude 5500 feet), March 7, 1899; coll. H. H. Smith.

Above deep rufous slightly darker on pileum and nape; concealed crest deep golden; rump band deep cinnamon rufous, much lighter than the back, but much deeper than in *M. vieillotoides*; below deep rufous, strongest over the breast and fore neck, lighter on the abdomen and lower tail-coverts; chin dusky ashy suffused with rufous; tail deep rufous like the back, shaded with dusky for about the apical sixth, the dusky portion forming an ill-defined sub-terminal band, the feathers being tipped with deep rufous; the wing-coverts rufous with blackish bases, the dusky portion almost wholly concealed by the broad rufous tips; quills, including outer primaries, rufous externally, the primaries passing into dusky apically. Length, 133 mm.; wing, 69; tail, 60; tarsus, 13; culmen, 15.

The female does not differ appreciably from the male; young birds differ from the adult chiefly in wholly lacking the bright yellow crown patch.

Myiobius assimilis is most nearly related to *M. vieillotoides* Lafr, the type locality of which is Caracas, Venezuela, but differs from it in being deeper rufous throughout, with very little of the dusky shading on the pileum and nape so characteristic of *M. vieillotoides*, and in having the tail almost wholly rufous instead of mainly dusky, and with much less black on the remiges.

This species is represented by 30 specimens, collected as follows: Valparaíso, 13 specimens, March 7-19 and April 4-15;

¹ Cf. Chapman, this Bulletin, VI, 1894, 42.

El Libano, 4 specimens, April 27 and 28, and May 6 and 12; Las Nubes, 13 specimens, Nov. 10 and 28, and Dec. 10-22. All were collected at points between 5000 and 6000 feet elevation. This series is remarkably uniform in size and coloration.

Four specimens from Las Palmales, Venezuela (F. W. Urich), representing true *M. vicillotioides*, differ very markedly from the Santa Marta series.

159. *Myiobius navius* (Bodd.).

Myiobius navius BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 and 178. Pueblo Viejo and Palomina.

One specimen, Minca, July 24.

160. *Muscivora mexicana* Sclater.

Muscivora mexicana SALV. & GODM. Ibis, 1879, 202 (Manaure); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 (Santa Marta).

Ten specimens: Bonda, 6 specimens, Oct. 11, Nov. 3, 8, 18 and 24, Minca, June 3, and July 31; Cacagualito, May 22.

161. *Megarhynchus pitangua* (Linn.).

Megarhynchus pitangua SALV. & GODM. Ibis, 1879, 201 (Atanques); 1880, 125 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 and 176 (Santa Marta and Palomina).

Seventeen specimens: Bonda, Jan. 23-26, Feb. 22, June 23-29, July 3, 9 and 13, Aug. 16 and 27, Sept. 4, Nov. 12; Minca, June 23.

162. *Myiodynastes audax nobilis* (Sclater).

Myiodynastes audax SALV. & GODM. Ibis, 1879, 201. Manaure.

Myiodynastes nobilis SCLATER, Cat. Bds. Brit. Mus. XIV, 1888, 184. Minca, Valle Dupar, Manaure, and Santa Marta (the latter the type locality).

Myiodynastes audax nobilis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 and 176 (Santa Marta and Palomina).

Twenty-seven specimens, taken as follows: Bonda, 18 specimens, Jan. 16 and 26, Feb. 22, May 10, June 18-July 2, Aug. 5 and 18, Sept. 4, Nov. 17, Dec. 5-12; Minca, 4 specimens, June 22, July 21 and 31; Cacagualito, 5 specimens, May 12-26, June 3.

August, 1900.]

163. *Myiodynastes chrysocephalus* (Tsch.).

Myiodynastes chrysocephalus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 and 176. Pueblo Viejo and San Francisco.

Ten specimens: El Libano, May 6; Valparaiso, March 11, 17 and 29, April 13, and May 31; Las Nubes, Dec. 8-20.

164. *Pitangus derbianus rufipennis* (Laf.).

Pitangus derbianus SALV. & GODM. Ibis, 1879, 201. Valle Dupar.

Pitangus derbianus rufipennis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta.

Four specimens: Bonda, June 29, July 15, Sept. 7; Santa Marta, July 14.

165. *Pitangus lictor* (Licht.).

One specimen, Cacagualito, May 14.

166. *Rhynchocyclus sulphureus* (Spix).

Rhynchocyclus sulphureus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 and 176. Santa Marta and Palomina.

Three specimens: Minca, Aug. 3; Bonda, Nov. 18 and Jan. —.

167. *Rhynchocyclus flaviventris* (Wied.).

Rhynchocyclus flaviventris SALV. & GODM. Ibis, 1880, 124 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 (Santa Marta).

Thirty-six specimens, all collected at Bonda, except one, as follows: Jan. 11-27, Feb. 2-17, July 1-11 and 14, Aug. 10-17, Sept. 7, Oct. 12 and 13, Nov. 5-28; Dec.—; Cacagualito, May 24.

168. *Rhynchocyclus æquinoctialis* (Sclater).

Two specimens, Onaca, Dec. 28 and 29.

169. *Myiozetetes texensis colombianus* (Cab. & Hein.).

Myiozetetes texensis colombianus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 and 176. Santa Marta and Palomina.

Nine specimens: Bonda, Jan. 9 and 19, and Oct. 28; Minca June 22; Santa Marta, July 15; Cacagualito, May 5 and 11.

170. Sublegatus glaber *Scl. & Salv.*

Sublegatus glaber WYATT, Ibis, 1871, 333 (Santa Marta); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 (Santa Marta).

Two specimens, Bonda, Jan. 31, June 21.

171. [Sublegatus platyrhyncha *Scl. & Salv.*

Sublegatus incanescens SALV. & GODM. Ibis, 1880, 124 (Minca).]

172. Legatus albicollis (*Vieill.*).

Legatus albicollis SALV. & GODM. Ibis, 1880, 124. Minca.

Eleven specimens: Bonda, June 22 and 27, and Aug. 5 and 22; Minca, June 22, July 22 and 31; Jordan, May 11.

173. Elænea pagana (*Licht.*).

Elænea pagana SALV. & GODM. Ibis, 1880, 124 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 (Santa Marta); Proc. N. Engl. Zool. Club, I, 1900, 79 (El Mamon).

Twenty specimens: Bonda, 13 specimens, Jan. 14 and 31, Feb. 7-11 and 27, May 11, July 5, and Aug. 22; Minca, July 26 and 27; Onaca, Jan. 7; Santa Marta, July 10-13; Cacagualito, May 24 and June 3.

174. Elænea pagana sororia *Bangs.*

Elænea sororia BANGS, Proc. Biol. Soc. Wash. XII, 1898, 175. Palomina and San Miguel.

Eleven specimens: Bonda, Jan. 31, Feb. 11 and 27, and July 11; Minca, Jan. 7 and July 27; Santa Marta, July 10-13.

Elænea sororia Bangs is very closely related to *E. albiceps*, with which it appears to intergrade, as does *E. albiceps* with *E. pagana*.¹

175. Elænea browni *Bangs.*

Elænea browni BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 and 175 (Pueblo Viejo and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1900, 78 (San Sebastian and El Mamon).

Twelve specimens: El Lorenzo (alt. 7000 ft.), May 12 and 13; El Libano (alt. 6000 ft.), April 25 and May 21; Valparaiso (alt. 5500 ft.), April 1-5.

¹ See this Bulletin, II, 1889, pp. 183-208.

Also a specimen collected at Minca, July 25, and another at Bonda, Feb. 3, seem referable here. All the specimens I have seen, including most of Mr. Bangs's series, that have been taken above 5000 feet altitude, prove referable to this very well marked form.

176. *Myiopagis placens* (d'Orb. & Lafr.).

Myiopagis placens BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Four specimens: Bonda, Feb. 10, Sept. 18 and Nov. 5; Minca, Aug. 2.

177. *Myiopagis gaimardi* (d'Orb.).

Myiopagis macilvainii BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Fifteen specimens, Bonda, Jan. 21-23, June 30, Aug. 1-26, Sept. 5, Oct. 13, Nov. 17, Dec. 12.

178. *Tyranniscus nigricapillus* (Lafr.).

Tyranniscus nigricapillus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 98. La Concepcion and Chirua.

Four specimens: El Libano, April 5, 25, and May 14; San Lorenzo, May 12.

179. *Tyranniscus griseiceps* ScL. & Salv.

Tyranniscus griseiceps BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Two specimens, Minca, June 18 and Aug. 3.

180. *Tyranniscus chrysops* (Sclater).

Tyranniscus chrysops SALV. & GODM. Ibis, 1880, 124 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 175 (Palomina).

Four specimens, Minca, July 24 and 29 and Aug. 2 and 4.

181. *Tyrannulus elatus* (Lath.).

Two specimens, Bonda, Feb. 4 and Aug. 16.

182. *Ornithion pusillum* (Cab. & Hein.).

Ornithion pusillum BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Four specimens, Bonda, Feb. 2, Aug. 30 and 31, Sept. 10.

183. *Ornithion inerme* Hartl.

Four specimens, Bonda, Jan. 20, Aug. 8 and 14, and Sept. 1.

184. *Myiopatris semifusca* Sclater.

Phyllomyias semifusca SALV. & GODM. Ibis, 1879, 201. Atanques.

Myiopatris semifusca BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Fifty-six specimens, all from Bonda except one, collected as follows: Jan. 10, 18 and 27, Feb. 2, 4, 11 and 27, May 19, July 7, 9, 11 and 13, Aug. 11, 15, 16, 25-29, Sept. 5-8, Oct. 4, 12, 13, 27, Nov. 11, 19; Cacagualito, May 24.

185. [*Myiopatris montensis* Bangs.

Myiopatris montensis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 97. Macotama, altitude 9000 feet, to Paramo de Chiruqua, altitude 12,000 feet.]

186. *Leptopogon amaurocephalus* Cabanis.

Two specimens, Bonda, Dec. 12 and Jan. 13.

These specimens agree very closely with examples from southern Brazil (Rio de Janeiro and Matto Grosso), and are referable here rather than to *L. amaurocephalus pileatus* (Sclater).

187. *Mionectes olivaceus* Lawr.

Mionectes olivaceus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158. Pueblo Viejo.

Twenty-six specimens: Minca, 1 specimen, July 24; Onaca, 1 specimen, Dec. 31; Valparaiso, 20 specimens, March 10-May 26; El Libano, 4 specimens, April 22 and May 5-9.

188. *Mionectes oleagineus* (Licht.).

Mionectes oleagineus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Twenty-four specimens: Bonda, 20 specimens, Jan. 10-28, Feb. 11 and 14, Aug. 23-30, Sept. 3, Oct. 4-13, Nov. 9-25; Minca, 2 specimens, Jan. 19 and July 27; Cacagualito, May 12-20.

189. [*Serpophaga cinerea grisea* (Lawr.).

Serpophaga cinerea grisea BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 97. Chirua, San Miguel, and La Concepcion.]

190. [*Hapalocercus paulus* Bangs.

Hapalocercus paulus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 96. Chirua, San Miguel, and La Concepcion.]

191. *Colopterus pilaris* Cabanis.

Colopterus pilaris SALV. & GODM. Ibis, 1880, 124 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136 (Santa Marta).

Twenty-one specimens, collected as follows: Bonda, 17 specimens, Jan. 11-21, Feb. 3-18, Aug. 8, 13 and 22, Nov. 3 and 10; Minca, 1 specimen, July 29; Cacagualito, 3 specimens, May 10-28.

192. *Euscarthmus granadensis* (Hartl.).

Euscarthmus granadensis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 98. La Concepcion.

One specimen, El Libano, May 6.

193. *Euscarthmus impiger* ScL. & Salv.

Euscarthmus impiger BANGS, Proc. Biol. Soc. Wash. XII, 1898, 136. Santa Marta.

Twenty-one specimens: Bonda, Jan. 12-27, Feb. 3, 8, 21 and 25, Aug. 19-22, Sept. 4, Oct. 9 and 21, and Dec. 19; Cacagualito, May 16.

194. *Todirostrum cinereum* (Linn.).

Two specimens, Cienaga, Sept. 9.

195. *Todirostrum nigriceps* Sclater.

Todirostrum nigriceps BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Four specimens, Bonda, July 14, Aug. 16 and 31, and Nov. 21.

196. *Todirostrum schistaceiceps* Sclater.

Todirostrum schistaceiceps BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135. Santa Marta.

Five specimens, Bonda, Jan. 11-13, Feb. 3, and Aug. 1.

197. [*Platyrhynchus albogularis* Sclater.

Platyrhynchus albogularis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 96. La Concepcion, "one female."]

198. *Machetornis rixosa* (Vieill.).

One specimen, Cacagualito, May 28.

199. *Fluvicola pica* (Bodd.).

Two specimens, Cienaga, Sept. 8 and 9.

200. *Sayornis cineracea* (Lafr.).

Sayornis cineracea SALV. & GODM. Ibis, 1879, 201 (San José); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 135 and 174 (Santa Marta and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1900, 78 (San Sebastian).

Two specimens, Cacagualito, June 1, and Onaca, Dec. 27.

201. [*Ochthæca polioogastra* Salv. & Godm.]

Ochthæca polioogastra SALV. & GODM. Ibis, 1880, 123 (Sierra Nevada de Santa Marta, type locality); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 174 (Macotama); *ibid.* XIII, 1899, 96 (Sierra Nevada, "at all stations between 9000 and 12,000 feet).

Probably not found much below 9000 feet, as it was not taken by Mr. Smith's collectors.]

202. *Ochthæca jesupi*,¹ sp. nov.

Type, No. 72727, ♀ ad., San Lorenzo, altitude 7000 feet, May 12, 1899; coll. H. H. Smith.

Above olive, with a slight tinge of dusky on the head; clear olive on nape and anterior part of back, passing into brownish olive on the lower back, rump and upper tail-coverts; wings and tail dusky, the feathers narrowly edged with olive on the tail and with brownish olive on the wings; greater coverts narrowly tipped with brownish, forming a barely recognizable wing-bar; superciliaries and a narrower frontal band yellow, the superciliaries broad in front of the eyes, much narrower behind the eyes; lores blackish; ear-coverts dusky tinged with olive; below throat and breast greenish yellow, passing into clear strong yellow over the abdomen and crissum; flanks olive tinged more or less with yellow. Bill black, feet horn color. Wing, 55 mm.; tail, 49; tarsus, 17; culmen, 9.

While *Ochthæca jesupi* is very distinct from any other described species of the genus it finds its nearest ally in *O. gratiosa* Sclater from Ecuador, from which it differs in being olive instead of brown above, with rather yellower under parts, narrower frontal

¹ Named in honor of Morris K. Jesup, Esq., President of the American Museum of Natural History, to whom the Museum is indebted for the fine collection of Colombian birds of which this species forms a part.

band and superciliaries, and in the absence of well-defined wing-bars. It is also somewhat smaller, as compared with Bogota specimens identified as *O. gratiosa* by Dr. Sclater.

This species is represented by four specimens, taken as follows: San Lorenzo, altitude 7000-7500 feet, May 12 and 13; El Libano, altitude 6000 feet, May 3; Valparaiso, altitude 5500 feet, March 8.

203. *Ochthœca olivacea*, sp. nov.

Type, No. 72728, ♂ ad., Valparaiso, altitude 5500 feet, April 14, 1899; coll. H. H. Smith.

Above dark clear greenish olive, blackish on the head, fading on the hind head into the uniform deep greenish olive of the rest of the upper surface; wings and tail dusky, the latter strongly edged with olive; wing-coverts and outer edge of secondaries, except basally, broadly edged with greenish yellow; primaries 2-5 similarly edged for the proximal half of their length, the others wholly black externally, like the proximal third of the secondaries, forming a conspicuous wing pattern of black and light greenish yellow; bend of wing and under coverts bright greenish yellow; frontal band and superciliaries clear white; sides of head grayish white, except a small black loreal spot; ear-coverts dusky; below throat and fore neck white or greenish white; breast and sides gray with an olive tinge, slightly flammulated with yellow; abdomen and crissum greenish yellow. Bill and feet deep black. Wing, 54 mm.; tail, 46; tarsus, 18; culmen, 14.

Ochthœca olivacea bears a general resemblance to *O. diademata*, its nearest ally, but differs from it in having the frontal band and superciliaries clear white instead of yellow, and in the rump being deep olive green like the back instead of rufescent. It is represented by five specimens, all taken at Valparaiso, April 5 and 14, 1899.

204. *Ochthodiæta pernix* Bangs.

Ochthodiæta pernix BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 95. Macotama, one specimen.

One specimen, San Lorenzo, May 12.

205. [*Myiotheretes striaticollis* Sclater.

Myiotheretes striaticollis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 174 (Macotama); Proc. N. Engl. Zool. Club, I, 1900, 78 (El Mamon.)]

206. [*Heliochera rubrocristata* (d'Orb. & Lafr.).

Heliochera rubrocristata SCLATER, Cat. Bds. Brit. Mus. XIV, 1888, 390 (Sierra Nevada de Santa Marta, coll. by Simons); BANGS, Proc. Biol. Soc.

Wash. XIII, 1899, 98 (Paramo de Chiruqua and Paramo de Macotama, 11,000 to 15,000 feet).]

207. *Attila parvirostris*, sp. nov.

Type, No. 72656, Minca, June 5, 1899; coll. H. H. Smith.

Above ferrugineous brown, front and lores whitish; narrow blackish shaft-lines on forehead only; rump ochraceous yellow; tail bright ferrugineous; wings blackish, the primaries slightly edged with pale rufous, the secondaries and median and greater coverts broadly edged with deep rufous, forming two conspicuous wing-bars on the coverts; inner wing-coverts and axillars pale ochraceous, as are the inner edges of the secondaries, fading to pale buffy white on the basal portion of the primaries; chin and throat whitish; breast and sides of abdomen olivaceous, the feathers broadly centered with dusky and edged with greenish yellow; middle of abdomen white faintly tinged with yellow; flanks ochraceous; crissum and under tail-coverts pale yellow; bill, in the type, deep black; feet horn color. Wing, 85 mm.; tail, 70; tarsus, 22; culmen, 21.

In general coloration this species is a miniature of *A. citreopygius*, but besides being very much smaller it lacks the strong black striations on the head and throat of that species, and has a more olivaceous breast. The difference in size is striking, the bill of *A. citreopygius* being twice as large as that of *A. parvirostris*, while the length of the wing in *A. citreopygius* is 93 mm. as against 85 mm. in *A. parvirostris*. It is also much smaller than *A. sclateri*, and differs from it strikingly in color.

In addition to the type from Minca, I refer doubtfully to this species two specimens from Valparaiso, taken March 10 and 17, which differ in having the bill horn color, and in having very little olivaceous below, the breast in one specimen being gray slightly tinged with olivaceous, and in the other gray with a brownish tinge; the tail in both is dusky rufous brown instead of ferrugineous. The difference may be seasonal, but I suspect it is specific; it seems, however, better to await further material before deciding.

208. *Attila rufpectus*, sp. nov.

Type, and only specimen, No. 71183, Las Nubes, altitude 5000 feet, Dec. 1, 1898; coll. H. H. Smith.

Above dark ferrugineous brown; front and superciliaries pale cinnamon rufous, with narrow blackish shaft-streaks formed by the black bristly feather tips; rump ochraceous; wings blackish, the median and greater coverts and the secondaries edged with dull brownish ferrugineous; inner coverts, axillars, and inner border of secondaries buffy ochraceous, fading to pale rufous on the basal

portion of the primaries; tail dusky rufous brown, like the back; chin and upper throat pale buffy white, with narrow black shaft-streaks formed by the bristly feather tips; breast dull rufous flammulated with darker; rest of lower parts including crissum, very pale rufous, rather stronger on the flanks; bill and feet horn color. Wing, 83 mm.; tail, 75; tarsus, 23.5; culmen, 22.

Attila rufipectus is a near ally of *A. spadiceus* of Guiana and Brazil, resembling it both in size and general coloration, from which it may prove to be only subspecifically separable. It is apparently nearer this than to *Attila flammulatus* Lafresnaye, said to have come from "Colombia," and the only species of *Attila* heretofore attributed to Colombia. Although the type and only known specimen of *A. rufipectus* differs widely from Lafresnaye's description of *A. flammulatus*, further material may show that Lafresnaye's name will have precedence.

In this connection I may add that *Attila cinnamomeus* Lawrence, from Mazatlan, Mexico, of which an authentic example is before me, belongs to the same group as the present species but differs in its wholly white under parts, flammulated on the breast and fore neck with dark ashy.

209. *Pachyrhamphus cinereiventris* Sclater.

Pachyrhamphus niger SALV. & GODM. Ibis, 1880, 169 (not of Spix). Santa Marta.

Pachyrhamphus cinereiventris SCLATER, Cat. Bds. Brit. Mus. XIV, 1888, 344 (includes the Simons specimens collected at Santa Marta, recorded by Salvin & Godman, *l. c.*).

Eighteen specimens: Bonda, 16 specimens, June 21, July 5, Aug. 1-24, Sept. 6, Oct. 13, 24 and 27, and Nov. 3; Cienaga, 1 specimen, Sept. 14; Valparaiso, 1 specimen, April 1.

These, except the Valparaiso specimen, are practically topotypes of the species, as are also the Simons specimens, recorded as *P. niger* by Salvin & Godman (*l. c.*).

210. *Hadrostomus homochrous* Sclater.

Two specimens, Cacagualito, May 12, and Bonda, without date.

211. *Tityra semifasciata* Cabanis.

Tityra personata SALV. & GODM. Ibis, 1880, 169. Minca.

Tityra semifasciata SCLATER, Cat. Bds. Brit. Mus. XIV, 1888, 330 (includes the Minca specimen recorded by Salvin & Godman, *l. c.*; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 (Pueblo Viejo).

Seven specimens : Minca, June 23 and July 22 ; Cacagualito, June 3 ; Valparaiso, May 27 and June 10.

212. [*Tityra albitorques* Dubus.

Tityra albitorques SALV. & GODM. Ibis, 1880, 169. Valencia.]

213. *Heteropelma veræpaci* Sclater.

Six specimens : Bonda, 4 specimens, Feb. 9, and May 8 ; Cacagualito, 2 specimens, May 20 and 21.

These specimens are not distinguishable from Central American examples of this species.

A young specimen in nestling plumage has the head dull rufous brown, lighter and redder than the back, which differs from that of the adult in being slightly more rufescent. The plumage below is peculiarly soft and woolly, and strongly rufescent instead of olive as in the adult.

214. *Pipreola auripectus decora* Bangs.

Pipreola auripectus decora BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 98. Chirua.

Fourteen specimens : Valparaiso, 11 specimens, March 27–April 14, and June 13 ; El Libano, 3 specimens, May 5–11.

215. *Manacus manacus abdivitus* Bangs.

Chiromacharis manacus SALV. & GODM. Ibis, 1880, 169. Minca.

Manacus manacus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137. Santa Marta.

Manacus manacus abdivitus BANGS, Proc. N. Engl. Zool. Club, I, 1889, 35.

Thirty-four specimens, taken as follows : Bonda, 10 specimens, Jan. 5–26, Nov. 23, Dec. 12 ; Minca, 9 specimens, Jan. 18 and 19, July 5 and 28, Aug. 1, and Nov. 24 ; Cacagualito, 8 specimens, May 7–25 ; Donama, 2 specimens, Dec. 22 ; Masinga Vieja, 3 specimens, Nov. 23 and 25 and Feb. 9 ; Jordan, 1 specimen, May 11.

216. *Chiroxiphia lanceolata* (Wagler).

Chiroxiphia lanceolata SALV. & GODM. Ibis, 1879, 202 (Manaure) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 (Santa Marta).

Forty-two specimens : Bonda, 23 specimens, Feb. 9–21, May

8-10, July 2, 6, 9 and 27, Aug. 2-25, Sept. 5, Oct. 8, Nov. 1-23 ; Minca, 1 specimen, Aug. 3 ; Cacagualito, 18 specimens, May 5-27.

217. *Pipra auricapilla* (Linn.).

Pipra auricapilla SALV. & GODM. Ibis, 1880, 169 (Minca) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 137 (Santa Marta).

Twenty-eight specimens, as follows : Bonda, Jan. 7-31, Oct. 24, Nov. 24 ; Onaca, Dec. 30-Jan. 7 ; Minca, Nov. 2 and 24 ; Agua Dulce, April 12 ; Las Nubes, Dec. 2, 22 and 30 ; Valparaiso, March 21, April 7, May 21.

218. *Dendrocolaptes validus* Tschudi.

Eleven specimens : Valparaiso, March 7, April 5, May 27, June 14 ; El Libano, April 25, May 3, 6, 9, and 20 ; Las Nubes, Nov. 30.

219. [*Dendrocincla meruloides* (Lafr.).

Dendromanes meruloides SALV. & GODM. Ibis, 1879, 202. Manaure.]

220. *Dendrocincla olivacea lafresnayi* Ridgw.

Dendrocincla olivacea anguina BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta ; one specimen) ; *ibid.* XIII, 1899, 100 (Palomina, Chirua, and La Concepcion ; one specimen each).

Seven specimens : Minca, July 28 ; Onaca, Jan. 4 ; Las Nubes, Dec. 5-7 ; Valparaiso, March 8 and April 1.

These specimens exactly agree with a Panama specimen in the Lawrence Collection identified as *Dendrocincla lafresnayi* Ridgw. by Mr. Ridgway.

221. *Picolaptes lachrymiger* (Des Murs).

Picolaptes lachrymiger SALV. & GODM. Ibis, 1880, 171 (San Sebastian) ; BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 100 (La Concepcion ; one specimen).

Thirty-two specimens, collected as follows : Valparaiso, 13 specimens, March 15-29, April 4-14, May 31, June 6 ; El Libano, 13 specimens, April 25-May 21, and June 17 ; Las Nubes, 4 specimens, Dec. 1 and 12-15 ; San Lorenzo, 2 specimens, May 12.

222. *Xiphocolaptes procerus* Cab. & Hein.

Xiphocolaptes procerus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177. Macotama.

Eleven specimens, collected as follows : Valparaiso, 4 specimens, March 17-26, April 1, May 26 ; El Libano, 3 specimens, April 29, May 12, June 16 ; San Lorenzo, 2 specimens, May 14 ; Las Nubes, 2 specimens, Dec. 6 and 15.

223. *Dendroplex picirostris* (Lafr.).

Dendroplex picirostris SALV. & GODM. Ibis, 1880, 171 (Santa Marta) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Nineteen specimens, all collected at Bonda, Jan. 21, Feb. 24, June 27, July 5, Aug. 13-30, Sept. 3, Nov. 5 and 17.

224. *Dendrornis nana* Lawrence.

Dendrornis susurrans SALV. & GODM. Ibis, 1880, 171. Minca.

Two specimens, Cacagualito, May 12 and July 29.

225. *Margarornis brunnescens* Sclater.

Premnoplex brunnescens BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 100. San Miguel and Chirua.

Five specimens : El Libano, May 9-21 ; Las Nubes, Dec. 9 ; Valparaiso, March 7.

226. [*Sittasomus olivaceus* Wied.]

Sittasomus olivaceus SALV. & GODM. Ibis, 1879, 202. Manaure.]

227. *Sclerurus albigularis propinquus* Bangs.

Sclerurus albigularis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177. Palomina, one specimen.

Sclerurus albigularis propinquus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 99. Chirua, one specimen.

Eleven specimens : Las Nubes, 7 specimens, March 10-25 and April 13 ; Valparaiso, 4 specimens, Dec. 3-15.

This series fully establishes the characters claimed by Mr. Bangs for his subspecies *propinquus*.

228. *Xenops genibarbis* Illiger.

Xenops genibarbis SALV. & GODM. Ibis, 1880, 171 (Minca) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Four specimens: Bonda, Nov. 16; Minca, May 29 and July 24; Cacagualito, May 27.

229. *Xenops rutilus* Licht.

One specimen, Las Nubes, Dec. 14.

230. *Anabazanops striaticollis* (Sclater).

Anabazanops striaticollis BANGS, Proc. Biol. Soc. Wash. XIII, 1898, 99. Chirua, San Miguel, and La Concepcion.

Twenty-four specimens: Onaca, 1 specimen, Nov. 28; Valparaiso, 11 specimens, March 7-27, April 5, May 27 and 30, June 8; El Libano, 4 specimens, April 21, May 6-25; Las Nubes, 8 specimens, Dec. 1-20.

231. *Thripadectes flammulatus* (Eyton).

One specimen, El Libano, May 10.

232. [*Automolus rufipectus* Bangs.

Automolus rufipectus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 158 (Pueblo Viejo); *ibid.* XIII, 1899, 99 (various localities, 3000 to 7500 feet).]

233. [*Siptornis wyatti* (Scl. & Salv.).

Synallaxis wyatti SALV. & GODM. Ibis, 1880, 170. Sierra Nevada, 10,000 to 12,800 feet.

Siptornis wyatti BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 99. Paramo de Chiruqua, 15,000 feet.]

234. *Siptornis antisiensis* (Sclater).

Synallaxis antisiensis SALV. & GODM. Ibis, 1880, 170.

Siptornis antisiensis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 99. Santa Cruz, Paramo de Macotama, and Paramo de Chiruqua.

Two specimens, Valparaiso, April 4 and June 1.

235. [*Synallaxis candæi* Lafr. & d'Orb.

Synallaxis candæi SALV. & GODM. Ibis, 1880, 170. Valencia.]

236. *Synallaxis cinnamomea* (Gmel.).

One specimen, Cienaga, Sept. 8.

237. [*Synallaxis fusco-rufa* Sclater.

Synallaxis fusco-rufa SCLATER, P. Z. S. 1882, 578, pl. xliii, fig. 1 (San Sebastian); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177 (San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 79 (San Sebastian and El Mamon).]

238. [*Synallaxis albescens* Temm.

Synallaxis albescens BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177. Palomina].

239. [*Leptasthenura andicola* Sclater.

Leptasthenura andicola SALV. & GODM. Ibis, 1880, 170. Sierra Nevada, altitude 10,000 feet.]

240. [*Cinclodes fuscus albidiventris* (Sclater).

Cinclodes fuscus albidiventris BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 98. Paramo de Chiriqua, altitude 15,000 feet.]

241. *Furnarius agnatus* Scl. & Salv.

Furnarius agnatus SALV. & GODM. Ibis, 1880, 170 (Valle Dumar); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Six specimens: Bonda, July 5, Aug. 1 and 29; Santa Marta, July 11.

242. *Grallaricula ferrugineipectus* Sclater.

One specimen, Las Nubes, Dec. 9.

243. [*Grallaria spiator* Bangs.

Grallaria spiator BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177. Macotama, altitude 8000 feet; one specimen.]

244. *Grallaria bangsi*,¹ sp. nov.

Type, No. 73145, ♂ ad., El Libano, altitude 7000 feet, May 25, 1899; coll. H. H. Smith.

Above uniform dark olive brown; primaries brownish olive; under wing-coverts deep chestnut, fading to pale chestnut on base of quills; lores dull buffy whitish; throat deep ochraceous, which color descends along the median line to the abdomen as a slight ochraceous edging to the feathers; rest of the under parts dark olivaceous, nearly like the back, broadly flammulated with pale buffy white. Bill rather light horn color, very light at tip and along the edges of the commissure; feet light horn color. Wing, 91 mm.; tail, 59; tarsus, 47; culmen, 23.

¹ Named for Mr. Outram Bangs, in recognition of his valuable contributions to our knowledge of the Santa Marta ornith.

This species finds its nearest ally in *Grallaria modesta* Sclater, from Bogota, from which it differs in its deep ochraceous throat, which extends from the base of the bill to the upper breast. It is represented by two specimens, exactly similar, the type from El Libano and another specimen, ♀ ad., from San Lorenzo (altitude 7500 feet), May 23, 1899.

245. *Myrmeciza boucardi* Berlepsch.

Myrmeciza boucardi BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138. Santa Marta.

Four specimens: Bonda, Nov. 10; Cacagualito, May 7 and 9.

246. *Rhamphocænus rufiventris sanctæ-martæ* (Sclater).

Rhamphocænus rufiventris sanctæ-martæ BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138. Santa Marta.

Seven specimens, Bonda, Jan. 10 and 16, Aug. 2 and 18, Sept. 14, Oct. 8, and Nov. 17.

247. *Formicivora intermedia* Cabanis.

Formicivora intermedia SALV. & GODM. Ibis, 1880, 171. Santa Marta.

Eriodora intermedia BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138. Santa Marta.

Fifty-seven specimens, all from Bonda, taken as follows: Jan. 11-27, Feb. 4-23, July 14, Aug. 11-27, Sept. 3-6, Oct. 6-21, Nov. 23, Dec. 8 and 23.

248. *Formicivora caudata* Sclater.

Formicivora caudata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 176. Palomina.

One specimen, Minca, July 25, is referred provisionally to this species.

249. *Myrmotherula sanctæ-martæ*, sp. nov.

Type, No. 72895, ♂ ad., Valparaiso, altitude 5500 feet, March 18, 1899; coll. H. H. Smith.

Adult male.—General color above uniform dark gray; wings dusky edged with gray, the coverts tipped with white, preceded by a distinct subapical bar of black; under wing-coverts gray; inner edge of quills whitish; tail dusky gray, almost concolor with the back, and with no trace of white on the tips of the feathers; throat black, the black area sharply defined; rest of the underparts concolor with the dorsal surface; under tail-coverts slightly tipped with whitish; bill and feet black. Wing, 52 mm.; tail, 43; tarsus, 17; culmen, 12.

Male juv.—A young male (Valparaiso, June 6) is changing from the nestling plumage to that of the adult. The remnants of the nestling plumage still present indicate that the young bird is brownish olivaceous above and ochraceous brown below, with the wings and tail rusty brown with a tinge of olivaceous, the under wing-coverts, axillars and inner edges of the rectrices buffy ochraceous. No white on the outer wing-coverts and no white tipping to the tail-feathers.

This species is represented by only the two specimens above described. Its nearest ally is apparently *M. longipennis*, from which, however, it is strongly distinguished by the absence of white on the rectrices and the much darker gray of the ventral surface.

I also refer to this species a single specimen (♂ ad.) from Los Palmales, Venezuela, collected by Mr. F. W. Urich.

250. *Thamnophilus doliatus* (Linn.).

One specimen, Bonda, Oct. 1.

251. *Thamnophilus pulchellus* (Cab. & Hein.).

Thamnophilus leucauchen SALV. & GODM. Ibis, 1880, 171. Santa Marta and Valencia.

Five specimens: Bonda, Oct. 1 and 5, and Dec. 19; Cienaga, Sept. 8.

252. *Thamnophilus melanonotus* Sclater.

Thamnophilus melanonotus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138. Santa Marta.

One hundred specimens, all collected at Bonda and taken at intervals throughout the year.

253. *Thamnophilus nævius* (Gmel.).

Thamnophilus nævius SALV. & GODM. Ibis, 1880, 171 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Eleven specimens: Bonda, Sept. 28, Oct. 8, Nov. 11 and 16; Minca, Jan. 19; Cacagualito, May 9-21; Onaca, Dec. 27 and Jan. 2.

254. [*Conopophaga browni* Bangs.

Conopophaga browni BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 100. Pueblo Viejo and Chirua, 7000 to 8000 feet.]

[August, 1900.]

255. [*Scytalopus sylvestris* Tacz.

Scytalopus sylvestris BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 101. San Francisco, one specimen.]

256. *Scytalopus latebricola* Bangs.

Scytalopus latebricola BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 101. Paramo de Chiruqua and Paramo de Macotama, altitude, 10,000 to 11,000 feet.

Two specimens, Valparaíso, April 13 and June 19.

257. *Cyanocorax affinis* Pelzeln.

Cyanocorax affinis SALV. & GODM. Ibis, 1879, 201 (Valle Dupar and Atanques); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Eight specimens: Bonda, June 17, July 8 and 9; Minca, July 26; Las Nubes, Dec. 1; Onaca, Dec. 29 and 30; Cacagualito, May 15.

258. *Quiscalus assimilis* Selater.

One specimen, Cienaga, Sept. 11.

259. [*Icterus icterus* (Linn.).

Icterus vulgaris SALV. & GODM. Ibis, 1879, 200. Valle Dupar.]

260. *Icterus xanthornus* (Linn.).

Icterus xanthornus SALV. & GODM. Ibis, 1880, 123 (Santa Marta): BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138 (Santa Marta).

Fourteen specimens: Santa Marta, July 10-14; Bonda, July 6, Aug. 16-22, Nov. 12 and 29, Dec. 1.

261. *Icterus mesomelas* Wagler.

One specimen, Cacagualito, May 25.

262. *Icterus auricapillus* Cassin.

Icterus auricapillus SALV. & GODM. Ibis, 1880, 123 (Santa Marta). BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139 (Santa Marta).

Eight specimens: Bonda, July 3 and 9, Aug. 17, Sept. 7, Oct. 6, Nov. 21, Dec. 6; Cacagualito, May 12.

263. [*Icterus galbula* (Linn.).

Icterus baltimore SALV. & GODM. Ibis, 1880, 123. Minca, Feb. 12.

Icterus galbula BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139. Santa Marta.]

264. [*Sturnella meridionalis* Sclater.

Sturnella ludoviciana SALV. & GODM. Ibis, 1879, 201. San Sebastian.

Sturnella meridionalis BANGS, Proc. N. Engl. Zool. Club, I, 1900, 79. San Sebastian and El Mamon.]

265. *Molothrus cassini* Finsch.

Molothrus discolor SALV. & GODM. Ibis, 1880, 123. Arianueca.

One specimen, ♀ ad., from Cacagualito, May 29.

266. *Dolichonyx oryzivorus* (Linn.).

Two specimens: Cienaga, Sept. 12, and Bonda, Oct. 12.

267. *Cassidix oryzivora* (Gmel.).

Cassidix oryzivora SALV. & GODM. Ibis, 1879, 201 (Manaure); BANGS Proc. Biol. Soc. Wash. XII, 1898, 159 and 178 (Pueblo Viejo and Palomina).

One specimen, Valparaiso, April 19.

268. *Cassicus persicus* (Linn.).

Cassicus persicus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 138. Santa Marta.

One specimen, ♂ ad., Cacagualito, May 28.

269. *Ostinops decumanus* (Pall.).

Ostinops decumanus SALV. & GODM. Ibis, 1879, 200 (San Jose and Atanques); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 177 (Palomina).

One specimen, ♂ ad., Onaca, Jan. 3.

270. *Pseudochloris citrina* (Pelz.).

One specimen, apparently a young female, taken at Onaca, Dec. 29, is provisionally referred here.

271. [*Emberizoides macrourus* (Gmel.).

Emberizoides macrurus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141 and 179 (Santa Marta, San Miguel, Macotama and Palomina.)

272. *Arremonops venezuelensis* Ridgw.

Arremonops venezuelensis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 104. Santa Marta.

Two specimens, juv., Bonda, Oct. 24.

273. [Arremonops caneus Bangs.

Embernagra conirostris SALV. & GODM. Ibis, 1880, 123. Santa Marta.

Embernagra conirostris caneus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140 (in part). Santa Marta.

Arremonops caneus BANGS, *ibid.* XIII, 1899, 103. Santa Marta.]

274. [Catamenia, sp.

Catamenia, sp.? BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 102. One female, Paramo de Chiriqua, 15,000 ft.]

275. Spiza americana (Gmel.).

Spiza americana BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140. Santa Marta.

Four specimens, Bonda, Jan. 4 and 5 and March 21.

276. Zamelodia ludoviciana (Linn.).

Hedymeles ludovicianus SALV. & GODM. Ibis, 1880, 122. Minca, Jan. 29.

Zamelodia ludoviciana BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140. Santa Marta, winter.

Three specimens: Masinga Vieja, Nov. 23; Valparaiso, March 29.

277. [Haplospiza nivaria Bangs.

Phrygilus unicolor SALV. & GODM. Ibis, 1880, 122. Sierra Nevada, from 9200 to 12,800 feet.

Haplospiza nivaria BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 102. Paramo de Chiriqua, alt. 15,000 ft., at the edge of snow.]

278. Myiospiza manimbe (Licht.).

Myiospiza manimbe BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 103. Paramo de Macotama.

Two specimens, Bonda, Sept. 28.

279. [Brachyspiza capensis peruviana (Less.).

Zonotrichia pileata SALV. & GODM. Ibis, 1879, 200 (Atanques); *ibid.* 1880, 222 (San Sebastian).

Brachyspiza capensis peruviana BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139 (Santa Marta); *ibid.* Proc. N. Engl. Zool. Club, I, 1900, 79 (San Sebastian and El Mamon).]

280. *Sycalis flaveola* (Linn.).

Sycalis flaveola SALV. & GODM. Ibis, 1880, 123. Santa Marta.

Twelve specimens: Bonda, Aug. 13, Sept. 6, Nov. 11; Cienaga, Sept. 10-14; Cacagualito, May 24.

281. [*Sycalis browni* Bangs.]

Sycalis browni BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139. Santa Marta.]

282. [*Spinus spinescens capitaneus* Bangs.]

Chrysomitris spinescens SHARPE, Cat. Bds. Brit. Mus. XII, 1888, 196. Sierra Nevada, and San Sebastian, collected by Simons.

Spinus spinescens capitaneus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 178 (San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 79 (San Sebastian).]

283. *Astragalinus psaltria columbianus* (Lafr.).

Chrysomitris mexicana and *C. columbiana* BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139. Santa Marta.

Six specimens: Bonda, Jan. 17 and Sept. 28; Onaca, Dec. 30; Minca, Aug. 3.

284. [*Oryzoborus funereus* Sclater.]

Oryzoborus funereus SHARPE, Cat. Bds. Brit. Mus. XII, 1888, 81 (Minca); BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 102 (Chirua and La Concepcion).]

285. *Cyanocompsa concreta sanctæ-martæ* Bangs.

Cyanocompsa concreta sanctæ-martæ BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139. Santa Marta.

Four specimens, Cacagualito, May 12-20.

286. *Volatinia jacarini splendens* (Vieill.).

Volatinia jacarini SALV. & GODM. Ibis, 1879, 200. San José.

Volatinia jacarini splendens BANGS, Proc. Biol. Soc. Wash. XII, 1898, 139. Santa Marta.

Thirteen specimens: Bonda, Aug. 6, 23, and 27, Sept. 28, Nov. 17; Onaca, Dec. 29; Minca, July 25; Masinga Vieja, Sept. 7; Cacagualito, May 14-21.

287. *Phonipara bicolor* (Linn.).

Two females, collected at Minca, Aug. 1, are referred to this species, but the Colombian form will doubtless prove separable when more material is received.

288. [*Sporophila plumbea colombiana* (Sharpe).

Spermophila plumbea SALV. & GODM. Ibis, 1880, 122. Santa Marta.

Spermophila plumbea colombiana SHARPE, Cat. Bds. Brit. Mus. XII, 1888, 99.]

289. *Sporophila minuta* (Linn.).

Eleven specimens : Bonda, Aug. 2, 27-29, Sept. 3 ; Onaca, Jan. 4 ; Cienaga, Sept. 9-17.

290. *Sporophila gutturalis* (Licht.).

Sporophila gutturalis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 179. Palomina.

Seven specimens : Cacagualito, 6, all males, May 12-26 ; Onaca, 1 ♀, Jan. 2.

291. *Sporophila grisea* (Gmel.).

Spermophila grisea SHARPE, Cat. Bds. Brit. Mus. XII, 1888, 96. Santa Marta. W. W. Saunders.

One specimen, Cienaga, Sept. 8.

292. *Sporophila luctuosa* (Lafr.).

Spermophila luctuosa SALV. & GODM. Ibis, 1880, 122 (Santa Marta) ; BANGS, Proc. N. Engl. Zool. Club, I, 1899, 79 (San Sebastian and El Mamon).

One specimen, ♂ ad., Masinga Vieja, Sept. 7.

293. [*Schistochlamys atra* (Gmel.).

Schistochlamys atra BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 104. La Concepcion and San Antonio.]

294. *Saltator striatipectus* (Lafr.).

Saltator albicollis SALV. & GODM. Ibis, 1880, 122. Minca.

Saltator striatipectus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140. Santa Marta.

Five specimens : Bonda, Dec. 7 and Jan. 10 ; Minca, July 28 and Aug. 3 and 4.

295. *Saltator magnus* (Gmel.).

Saltator magnus SALV. & GODM. Ibis, 1880, 121 (Minca) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140 and 178 (Santa Marta, San Miguel, and Palomina).

Three specimens : Onaca, Jan. 6 ; Cacagualito, May 27 ; Minca, July 31.

296. *Saltator olivaceus* Cab.

Saltator olivaceus SALV. & GODM. Ibis, 1880, 121. Santa Marta.

Eight specimens : Bonda, Nov. 17, Dec. 2 and 22, Jan. 5 ; Santa Marta, July 12 and 14.

297. *Arremon schlegeli* Bonap.

Arremon schlegeli SALV. & GODM. Ibis, 1880, 121 (Minca) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 140 (Santa Marta).

Seventeen specimens, as follows : Bonda, Oct. 12, Nov. 15 ; Minca, June 5 and 23, July 6, 25-28, Aug. 4 ; Onaca, Dec. 28 ; Valparaiso, May 31.

298. *Buarremon basilicus* Bangs.

Buarremon basilicus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 159 (Pueblo Viejo) ; *ibid.* XIII, 1899, 104 (Chirua and San Francisco).

Twelve specimens, as follows : Valparaiso, 9 specimens, March 10, 14, and 25, April 12-15, May 26, June 28 ; El Libano, May 9, 18, and 20.

299. *Buarremon assimilis* (Boiss.).

Four specimens, Bonda, Oct. 24 (2 juv. in nestling plumage), Dec. 14 and 17 (2 adults).

The young in first plumage differ from the adults in having the black head stripes brown instead of black and the median stripe very indistinct ; the olive of the back is blotched with brown ; the throat is pale greenish yellow instead of white ; the rest of the lower parts are olivaceous, with the breast streaked with blackish brown.

300. *Buarremon melanocephalus* Salv. & Godm.

Buarremon melanocephalus SALV. & GODM. Ibis, 1880, 121 (San Sebastian) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 178 (San Miguel, Palomina, and San Francisco) ; *ibid.* Proc. N. Eng. Zool. Club, I, 1899, 79 (San Sebastian and El Mamon).

Twelve specimens, as follows : Las Nubes, 1 specimen, Dec. 22 ; Valparaiso, 5 specimens, March 7 and 8, April 5 and 8, June 10 ; El Libano, 6 specimens, April 22, May 4-22.

301. [*Nemosia pileata* (Bodd.).

Nemosia pileata SALV. & GODM. Ibis, 1880, 121. Valencia.]

302. [Tachyphonus rufus (Bodd.).

Tachyphonus rufus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160 and 179 (Pueblo Viejo and Palomina).]

303. Eucometis cristata (Du Bus).

Eucometis cristata SALV. & GODM. Ibis, 1880, 121 (Arihueca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142 (Santa Marta).

Four specimens: Bonda, Feb. 18 and Nov. 10; Onaca, Jan. 5; Cacagualito, May 9.

304. Piranga hæmalea Salv. & Godm.

Piranga faceta BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141 (Santa Marta); *ibid.* XIII, 1899, 104 (La Concepcion and San Miguel).

Seven specimens: Bonda, Jan. 7 and Aug. 23; Onaca, Dec. 26 and 30; Minca, July 27; Cacagualito, May 29; Masinga Vieja, Sept. 7.

305. Piranga rubra (Linn.).

Piranga æstiva SALV. & GODM. Ibis, 1879, 200 (Atanques, Feb. 26); *ibid.* 1880, 121 (Santa Marta, Dec. 27, and Minca, Jan. 16).

Piranga rubra BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141 (Santa Marta, winter).

Thirty-three specimens, of which 31 are from Bonda, as follows: Bonda, Nov. 8-30, Dec. 1-28, Jan. 3-24, Feb. 23; Onaca, Jan. 8; Valparaiso, March 17.

Three of the males (Nov. 17 and 22 and March 17) are in full adult dress; six others (Dec. and Jan.) are molting into the red plumage, but many others, evidently young males, show no signs of molt.

306. Ramphocelus dimidiatus (Lafr.).

Ramphocelus dimidiatus SALV. & GODM. Ibis, 1880, 120 (San Antonio); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141, 159, and 179 (Santa Marta, Pueblo Viejo, Palomina, and San Miguel).

Fifteen specimens, Cacagualito, May 5-June 2.

307. Tanagra cyanocephala auricrissa (Sclater).

Two specimens: Valparaiso, April 1; El Libano, May 11.

308. *Tanagra palmarum melanoptera* (Hartl.).

Tanagra palmarum SALV. & GODM. Ibis, 1880, 120. Minca.

Tanagra palmarum melanoptera BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141. Santa Marta.

Three specimens : Cacagualito, May 20 and June 2 ; Bonda, Aug. 30.

309. *Tanagra cana* Swains.

Tanagra cana SALV. & GODM. Ibis, 1880, 120 (Santa Marta) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141 (Santa Marta).

Eighteen specimens : Bonda, 17 specimens, Feb. 18, July 13, Aug. 4-20, Sept. 8, Oct. 20-22, Nov. 2-29, Dec. 9-17 ; Cacagualito, 1 specimen, May 27.

310. *Pæcilothraupis melanogenys* Salv. & Godm.

Pæcilothraupis melanogenys SALV. & GODM. Ibis, 1880, 120, pl. iii. (near San Sebastian, 8000 ft., June 22) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 179 (Macotama) ; *ibid.* XIII, 1899, 104 (alt. 7,500-12,000 ft.).

Eleven specimens : El Libano (6000 ft.), April 22, May 18-21 ; San Lorenzo (7000 ft.), May 2-13.

311. *Calospiza desmaresti* (Gray).

Calliste desmaresti SALV. & GODM. Ibis, 1880, 120. Minca and Guallabal, alt. 3000 ft.

Calospiza desmaresti BANGS, Proc. Biol. Soc. Wash. XII, 1898, 159 and 179. Santa Marta and Pueblo Viejo.

Forty-nine specimens, as follows : Bonda, 20 specimens, Sept. 29 ; Agua Dulce, 2 specimens, April 12 ; Onaca, 17 specimens, Dec. 2-20 ; Cacagualito, 1 specimen, May 19 ; Valparaiso, 9 specimens, March 13, 29, and 30, and April 3-14.

312. *Calospiza atricapilla* (Lafr.).

Twenty-two specimens : Valparaiso, 20 specimens, March 25-April 12, May 24 and 26, June 8 and 17 ; Las Nubes, 2 specimens, Dec. 17 and 20. The series contains only one female and one ♂ juv., 20 of the 22 specimens being adult males.

It seems strange that this species should not have been taken by Mr. Brown, and that *C. cyanoptera* should have been taken by both Mr. Simon and Mr. Brown and not by Mr. Smith's collectors.

313. [*Calospiza cyanoptera* (Swains.).

Calliste cyanoptera SALV. & GODM. Ibis, 1879, 200 (San José and Atanques); *ibid.* 1880, 120 (Minca).

Calospiza, sp. BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141. Santa Marta.

Calospiza cyanoptera BANGS, Proc. Biol. Soc. Wash. XII, 1898, 159 and 179. Pueblo Viejo, Palomina, and San Miguel.]

314. *Euphonia crassirostris* Sclater.

Euphonia lanirostris SALV. & GODM. Ibis, 1879, 199 (Atanques, alt. 2700 ft.); *ibid.* 1880, 119 (Santa Marta and Minca).

Euphonia crassirostris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141 and 179. Santa Marta and Palomina.

Sixty-eight specimens, as follows: Bonda, 57 specimens, Jan. 5-17, June 16 and 22, July 13, Aug. 3-22, Sept. 13, Oct. 7 and 8, Nov. 9-25, Dec. 6 and 8; Onaca, 2 specimens, Jan. 6; Minca, 4 specimens, July 22-31; Cacagualito, 5 specimens, May 10-16, June 3.

Euphonia crassirostris is smaller than *E. lanirostris*, to which it has often been referred, and the adult males are much less deeply colored throughout, especially below, where the yellow is a light clear yellow and not the deep, almost gamboge yellow of *E. lanirostris*. There is a corresponding difference in the olive green of the young males and females. (See further on this point, this 'Bulletin,' Vol. III, 1891, p. 351.)

315. *Euphonia trinitatis* Strickl.

Euphonia trinitatis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 141. Santa Marta.

Twenty-six specimens, Bonda, Jan. 13 and 17, June 28, July 13, Aug. 5-27, Sept. 2-13, Oct. 3-11, Nov. 8-13.

316. *Chlorophonia frontalis* Sclater.

Chlorophonia frontalis SALV. & GODM. Ibis, 1879, 199 (Valley of Chinchica and San José); BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 104 (Chirua, La Concepcion, and San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 80 (San Sebastian.)

Forty-five specimens: Onaca, 11 specimens, Dec. 31 and Jan. 5-8; Las Nubes, 17 specimens, Dec. 8-20; Valparaiso, 16 specimens, April 1-7, March 13-30; El Libano, 1 specimen, May 8.

317. *Stelgidopteryx uropygialis* (Lawr.).

Stelgidopteryx uropygialis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142. Santa Marta.

Eleven specimens, Bonda, Jan. 18, July 1, Sept. 6 and 7 (in molt), Oct. 11, Nov. 9 and 29, Dec. 15, and Jan. 18.

318. [*Atticora cyanoleuca* (Vieill.).

Atticora cyanoleuca BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. La Concepcion, alt. 3000 ft.]

319. *Cyclarhis flavipectus canticus* Bangs.

Cyclarhis flavipectus SALV. & GODM. Ibis, 1880, 119. Valencia.

Cyclarhis flavipectus canticus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142. Santa Marta.

Eleven specimens, Bonda, Jan. 6 and 18, June 30, Aug. 10, 15, and 31, Sept. 5 and 8, Nov. 18 and 30, and Dec. 19.

In addition to the features given by Mr. Bangs for this form, it may be noted that the Santa Marta specimens have the abdomen and lower tail-coverts much more strongly suffused with buff than Trinidad and Venezuela (Cumaná) examples.

320. *Hylophilus brunneus*, sp. nov.

Type, No. 70572, ♀ ad., Las Nubes, alt. 5000 ft., Dec. 14, 1898; coll. H. H. Smith.

Front, lores and cheeks brownish ochraceous, darker on the pileum and passing gradually on the nape into the olivaceous gray of the rest of the dorsal surface; outer wing-coverts and quills fuscous, externally broadly margined with ochraceous brown; inner webs broadly margined with pale ochraceous; under wing-coverts deep ochraceous; rectrices fuscous broadly margined with rusty brown; throat and breast brownish ochraceous; rest of under parts olivaceous brown; bill black above, lighter below, especially at base; feet grayish black. Wing, 55 mm.; tail, 42; tarsus, 16; culmen, 13.

This species is very different from all the other members of the genus, through the dull olivaceous gray dorsal surface, ochraceous throat and breast, and olive brown underparts. It is represented by two adult females, taken as follows: Las Nubes, Dec. 14 (type), and Valparaiso, March 18. The color of the lower parts very closely resembles that of the female of *Diglossa albilateralis*.

321. *Hylophilus flavipes* Lafr.

Hylophilus flavipes BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142. Santa Marta.

Thirty-nine specimens, all from Bonda, collected as follows : Jan. 9-28, Feb. 3-24, July 9, Aug. 6-31, Sept. 6, Oct. 22.

Vireo acuticauda Lawrence, usually synonymized with *Hylophilus aurantirostris*, is referable to *H. flavipes*, as shown by comparison of the type with the present large series of both *H. aurantirostris* and *H. flavipes*.

Hylophilus viridiflavus Lawrence, from Panama, while closely allied to *H. flavipes*, is so different from it as apparently to warrant its recognition as specifically distinct.

322. *Hylophilus aurantiifrons* Lawr.

Hylophilus hypoxanthus SALV. & GODM. Ibis, 1880, 118 (not of Pelzeln). Valencia.

Hylophilus aurantiifrons BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142. Santa Marta.

Seven specimens, Bonda, Jan. 11 and 21, Aug. 3, Nov. 8 and 17.

The name *Hylophilus hypoxanthus* Pelzeln (*Hylophilus aurantirostris hypoxanthus*) may well be retained for the form found in Trinidad, and on the adjoining Venezuelan coast, Guiana, etc., which differs from true *auranti-rostris* from Panama and the northern coast region of Colombia and Venezuela in having a distinct buffy or ochraceous suffusion over the whole pectoral region, but deepest on the sides of the breast.

323. *Vireo josephæ* Sclater.

Vireo josephæ BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. One specimen, El Paramo de Macotama, alt. 11000 ft.

Ten specimens : Valparaiso, April 4 ; El Libano, April 25 and 28, and May 6, 9, and 12 ; Las Nubes, Dec. 6-10.

324. *Vireo chivi agilis* (Licht.).

Vireo chivi agilis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 142. Santa Marta.

Fifty specimens, all taken near Bonda, as follows : Bonda, 44 specimens, Jan. 17, 23, and 26, Feb. 8-17, June 25-29, July 8

Aug. 9-30, Sept. 5, Oct. 8, Nov. 23; Minca, July 27 and Aug. 4; Santa Marta, July 1; Quebra Concha, Aug. 18; Cacagualito, May 19.

325. *Vireo flavifrons* Vieill.

Vireosylva flavifrons SALV. & GODM. Ibis, 1880, 118. Minca, Feb. 13.

One specimen, Onaca, Dec. 28.

326. *Vireo flavoviridis* (Cassin).

Seven specimens, Bonda, Aug. 12 and 25, Sept. 13, Oct. 4-13.

327. [*Vireo olivaceus* (Linn.).

Vireosylva olivacea SALV. & GODM. Ibis, 1880, 118. Santa Marta, April 3.]

328. *Vireo calidris barbatula* (Baird).

Eleven specimens, Bonda, Aug. 17-Sept. 18.

329. *Procnias viridis* Ill.¹

Procnias tersa SALV. & GODM. Ibis, 1879, 199 (Manaure); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 179 (Palomina, San Miguel, and San Francisco).

Nine specimens: Minca, June 6-28 and July 26; Valparaiso, April 5 and 14, and June 30.

330. *Cœreba luteola* (Licht.).

Certhiola luteola SALV. & GODM. Ibis, 1880, 119. Santa Marta.

Three specimens: Cacagualito, May 12; Santa Marta, July 10; Cienaga, Sept. 15.

331. *Cyanerpes cæruleus microrhynchus* (Berl.).

Cœreba cærulea SALV. & GODM. Ibis, 1880, 119. Minca.

Arbelorkhina cærulea microrhyncha BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

Fifty-four specimens, as follows: Bonda, 44 specimens, Nov. 29, Jan. 6-Feb. 8; Minca, July 5, 16, 27, and Aug. 1; Onaca, Dec. 29; Las Nubes, Dec. 15; Cacagualito, May 30.

332. *Cyanerpes cyanea eximea* (Berl.).

Cœreba cyanea SALV. & GODM. Ibis, 1879, 199 (Manaure, alt. 4000 ft.); *ibid.* 1880, 119 (Minca.)

Arbelorkhina cyanea eximea BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

¹ Cf. Allen, this Bulletin, II, pp. 69, 70, March, 1889.

Sixty-two specimens, as follows: Bonda, 39 specimens, Jan. 11-26, Feb. 2-9, May 11, Aug. 14-Sept. 1, Oct. 7-14, Nov. 20, Dec. 10; Cacagualito, 19 specimens, May 5-30; Minca, 4 specimens, July 25-Aug. 3.

333. *Dacnis napæa* Bangs.

Dacnis napæa BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

Eight specimens: Bonda, Aug. 19 and Jan. 15-19; Cacagualito, May 12 and June 1.

334. *Dacnis plumbea* (Lath.).

Two specimens, Sept. 14.

335. [*Conirostrum rufum* Lafr.]

Conirostrum rufum BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. Paramo de Chiruqua and Paramo de Macotama.]

336. [*Diglossa sittoides similis* (Lafr.).

Diglossa sittoides similis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 179 (San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 80 (San Sebastian and El Mamon).]

337. [*Diglossa aterrima* (Lafr.).

Diglossa aterrima SALV. & GODM. Ibis, 1880, 119. Sierra Nevada de Santa Marta, 10,000-11,000 ft.

I include this species in the belief that if the specimens had been what Mr. Bangs has since described as *D. nocticolor* they could not have been referred by these authors to *D. aterrima*.]

338. *Diglossa nocticolor* Bangs.

Diglossa nocticolor BANGS, Proc. Biol. Soc. Wash. XII, 1898, 180. Macotama, 8000 ft.

This fine species is represented by a single specimen, ♂ ad., collected at El Libano in May.

339. *Diglossa albilateralis* Lafr.

Diglossa albilateralis SALV. & GODM. Ibis, 1880, 119 (near San Sebastian); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 179 (San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 80 (San Sebastian and El Mamon).

Five specimens: El Libano, April 22, May 2 and 17; Las Nubes, Dec. 13.

340. *Basileuterus cinereicollis* Sclater.

Basileuterus conspicillatus SALV. & GODM. Ibis, 1880, 117. Two females, San José, types of the species.

Basileuterus cinereicollis BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160 and 180. Pueblo Viejo, San Francisco, and Palomina.

Thirty-eight specimens : Las Nubes, Nov. 20 and Dec. 1-14 ; Onaca, Nov. 28-Dec. 14 ; Valparaiso, March 8-30, April 6 and 17, May 21-31, June 9 ; El Libano, April 22, May 6, 12, 21, and 30.

This series of 38 specimens of *Basileuterus cinereicollis* presents a vast amount of variation in the color of the central crown patch, which, in the Valparaiso series of 18 March specimens, varies from clear yellow through yellow more or less tinged with ashy at the surface to deep brownish orange ; in the greater part of the specimens the crown patch is decidedly orange rather than yellow, and in many of the specimens the orange is quite as intense and pure as in *B. coronatus*. That this variation is not due to season is evident from the period (three weeks) covered by this series ; in fact, some of the specimens showing the greatest difference in the color of the crown patch were collected within a few days of each other. Again, the difference is not sexual, as yellow-crowned and orange-crowned specimens seem to occur with about equal frequency in each sex. It may be due to age, young birds having a yellow crown patch and old birds an orange crown patch. This is indicated by the fact that a large proportion of the specimens collected in November and December have the crown yellow, or yellow more or less tinged with orange. (In many specimens the tips of the crown feathers are obscured by ashy, whether taken in fall or spring.)

Basileuterus cinereicollis was described by Sclater in 1864 (P. Z. S., 1864, p. 166) from a single specimen from Bogota, and a second specimen was received the next year from the same locality (P. Z. S., 1865, p. 285, pl. ix, fig. 2). These were the only specimens known to Mr. Sharpe (Cat. Bds. Brit. Mus., X, 382) in 1885.

Basileuterus conspicillatus Salvin & Godman was described (Ibis, 1880, 117) from two females collected at San José, Sierra Nevada de Santa Marta, in June. These two specimens appear to be the only specimens known to Mr. Sharpe (l.c.) in 1885.

The alleged difference between the two forms consists in the color of the crown patch, which in *B. cinereicollis* is yellow and in *B. conspicillatus* orange. Both forms are obviously represented in the present Santa Marta series, with also every stage of intergradation between them. I have accordingly adopted the earlier name *cinereicollis* in place of *conspicillatus*.

341. *Basileuterus cabanisi* Berl.

Basileuterus cabanisi SALV. & GODM. Ibis, 1880, 117 (Minca); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144 (one specimen, Santa Marta).

Eight specimens: Minca, July 20; Las Nubes, Dec. 3; Onaca, Nov. 28 and Dec. 28-Jan. 4.

342. *Basileuterus mesochrysus* Sclater.

Basileuterus mesochrysus SALV. & GODM. Ibis, 1879, 198 (Manaure); *ibid.* 1880, 117 (Chirua); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144 and 180 (Santa Marta and Palomina).

Eleven specimens: Bonda, Aug. 23; Minca, June 22, July 22-28, Nov. 24; Cacagualito, May 17-28.

343. *Setophaga flavivertex* Salvin.

Setophaga flavivertex BANGS, Proc. Biol. Soc. Wash. XII, 1898, 180. Macotama.

Seven specimens, El Libano, April 22-28, May 11 and 12.

344. *Setophaga verticalis* d'Orb. & Lafr.

Setophaga verticalis SALV. & GODM. Ibis, 1880, 118 (San Sebastian); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 180 (San Miguel); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 80 (San Sebastian and El Mamon).

Ten specimens: Las Nubes, Nov. 29-Dec. 10; Valparaiso, March 13 and 23; El Libano, May 2.

345. *Setophaga ruticilla* (Linn.).

Setophaga ruticilla SALV. & GODM. Ibis, 1879, 199; 1880, 118 (Atanques, Feb. 26, and Minca, Jan. 15-18); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144 (Santa Marta).

Fourteen specimens: Bonda, Sept. 2 and 27, Nov. 12 and 16, Jan. 2 and 10; Valparaiso, March 11-30.

346. [*Geothlypis philadelphia* (Wils.).

Geothlypis philadelphia BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. Ten specimens, Chirua and La Concepcion, Feb. 12-March 25.]

347. *Geothlypis agilis* (Wils.).

One specimen, Bonda, Oct. 22.

This is apparently the first 'winter' record for this species.

348. *Geothlypis formosa* (Wils.).

Geothlypis formosa BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144. One specimen, Santa Marta, winter.

Five specimens, Bonda, Oct. 7 and 8, and Nov. 10 and 24.

349. *Seiurus noveboracensis* (Gmel.).

Seiurus noveboracensis SALV. & GODM. Ibis, 1880, 116 (Minca); BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105 (La Concepcion, March 17, and Chirua, Feb. 7).

Five specimens: Bonda, Sept. 8, Oct. 22 and 25, and Nov. 5; Cienaga, Sept. 14.

350. [*Seiurus noveboracensis notabilis* Ridgw.]

Seiurus noveboracensis notabilis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. Chirua, Feb. 7.]

351. *Seiurus motacilla* (Vieill.).

Seiurus motacilla BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

One specimen, Bonda, Nov. 8.

352. *Dendroica æstiva* (Gmel.).

Dendroica æstiva SALV. & GODM. Ibis, 1880, 117 (Minca, Jan. 24); BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143 (Santa Marta).

Twenty-nine specimens, Bonda, Aug. 27-Jan. 31.

353. *Dendroica striata* (Forst.).

Thirty-one specimens, all from Bonda, collected Oct. 7-Nov. 22.

354. *Dendroica castanea* (Wils.)

One ♂ juv., Bonda, Oct. 27.

355. *Dendroica cærulescens* (Gmel.).

One adult male, Las Nubes, Dec. 16.

[August, 1900.]

356. *Dendroica blackburniæ* (Gmel.).

Six specimens : Las Nubes, Dec. 10-13 ; Valparaiso, March 24 and 29.

357. *Compsothlypis pitiayumi pacifica* (Berl.).

Parula pitiayumi SALV. & GODM. Ibis, 1880, 117. Minca.

Compsothlypis pitiayumi pacifica BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

Three specimens : Onaca, Dec. 31 ; Valparaiso, April 1 and 13.

358. *Helminthophila peregrina* (Wils.).

Helminthophaga peregrina SALV. & GODM. Ibis, 1880, 117. Minca, Jan. 14 and 17, and March 26.

Helminthophila peregrina BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143. Santa Marta.

Eleven specimens : Bonda, Nov. 3 ; Onaca, Dec. 29 and Jan. 7 ; Las Nubes, Dec. 1-22 ; Valparaiso, March 17 and April 4.

359. *Helminthophila chrysoptera* (Linn.).

Helminthophaga chrysoptera SALV. & GODM. Ibis, 1880, 117. Minca, Feb. 8.

Helminthophila chrysoptera BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160. Pueblo Viejo, March 20.

Three specimens : Bonda, Sept. 6 and Oct. 3 ; Las Nubes, Dec. 7.

360. [*Helminthophila pinus* (Linn.).

Helminthophila pinus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. One male, Chirua, March 21.]

361. *Protonotaria citrea* (Bodd.).

Thirty-seven specimens, all from Bonda, collected as follows : Oct. 8-12, Nov. 12-22, Dec. 1-12, Jan. 10-30.

362. *Mniotilta varia* (Linn.).

Mniotilta varia SALV. & GODM. Ibis, 1880, 117 (Minca, Jan. 14 and 17 and March 26) ; BANGS, Proc. Biol. Soc. Wash. XII, 1898, 143 (Santa Marta).

Six specimens : Bonda, Aug. 21 and Sept. 29 ; Las Nubes, Dec. 21 ; Onaca, Dec. 29 and Jan. 4.

363. [*Troglodytes monticola* Bangs.

Troglodytes monticola BANGS, Proc. Biol. Soc. Wash. XII, 1898, 106. Paramo de Chiruqua and Paramo de Macotama, alt. 11,000-15,000 ft.]

364. *Troglodytes musculus rufulus* (Cab.).

Troglodytes tessellatus SALV. & GODM. Ibis, 1879, 198 (Marocaso); *ibid.* 1880, 117 (Santa Marta).

Troglodytes rufulus SHARPE, Cat. Bds. Brit. Mus. VI, 1881, 258, in part,—the reference to the above-mentioned Santa Marta specimens.

A series of 8 specimens is provisionally referred to this subspecies, taken as follows: Minca, June 21; Cacagualito, May 16 and 17 (4 specimens, 1 juv. in first plumage); Cienaga, Sept.; Bonda, June 22 (juv.) and Oct. 8; Minca, June 21.

These examples agree very well with examples from Trinidad, in several instances specimens from the two localities being practically indistinguishable. The Trinidad specimens are apparently strictly referable to the type form of *rufulus* from Guiana. Mr. Sharpe (*l. c.*) also considers British Guiana (Bartica Grove) specimens "identical with the Santa Marta race."

365. *Thryothorus latus* Bangs.

Thryothorus latus BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160 and 180 (Pueblo Viejo and Palomina).

Six specimens: Onaca, Dec. 20, ad.; Cacagualito, May 28 and 29, ad. and juv. in first plumage; Minca, July 6, 22, and 26, 2 ad. and 1 juv.

The young in first plumage has the head nearly concolor with the back, which latter is similar in color to that of the adult; the throat is dull grayish brown, almost without black spotting; the breast is buffy olivaceous brown, without spotting, and the rest of the lower surface is nearly uniform dull olive brown with a tinge of buff. The young appear to molt directly from this plumage into that of the adult.

366. *Thryophilus rufalbus castanonotus* (Ridgw.).

Thryophilus rufalbus SALV. & GODM. Ibis, 1880, 116. Minca.

Thryophilus minlosi BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144 (not of Berlepsch). Santa Marta.

Ten specimens, collected as follows: Cacagualito, May 7–June 2; Bonda, March 15 and Nov. 24; Minca, July 31.

These specimens agree well with specimens from Panama, on the one hand, and with examples from Cumanacoa, Venezuela, on the other. The *Thryophilus minlosi* Berlepsch, from Bucara-

manga, is a much paler bird, more like *T. sinaloa* Baird, as shown by the original description and figure, and it is also from a very different faunal district.

367. *Henicorhina anachoreta* Bangs.

Henicorhina anachoreta BANGS, Proc. N. Engl. Zool. Club, I, 84, Dec. 17, 1899. El Paramo de Chiruqua, between 11,000 and 12,000 feet altitude.]

368. *Henicorhina leucophrys* (Tschudi).

Henicorhina leucophrys BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160 and 181. Pueblo Viejo, San Francisco, Palomina, and San Miguel.

Seventeen specimens, collected as follows: Valparaiso, Dec. 3-17; El Libano, May 4 and 12.

369. *Microcerculus marginatus* (Sclater).

Microcerculus marginatus BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 107. Chirua, one specimen.

I refer provisionally to this species a single specimen from Onaca, collected Jan. 7, 1899.

370. *Heleodytes nuchalis* (Cab.).

One specimen, Cienaga, Sept. 16.

371. *Heleodytes griseus* (Swains.).

Camplorhynchus griseus SALV. & GODM. Ibis, 1880, 116. Santa Marta.

Nine specimens, as follows: Santa Marta, July 14; Cacagualito, May 24; Bonda, July 6, 7, and 14, Aug. 16, Nov. 29, and Dec. 5.

The young, only a few weeks from the nest, closely resemble the adults; the females differ from the males in having the head dark rufous brown instead of black, the whole top of the head being also much lighter than the mantle.

372. *Donacobius atricapillus* (Linn.).

Three specimens, Cienaga, Sept. 16.

373. *Mimus gilvus columbianus* (Cab.).

Mimus gilvus SALV. & GODM. Ibis, 1880, 116. Santa Marta.

Mimus gilvus columbianus BANGS, Proc. N. Engl. Zool. Club, I, 1899, 80. San Sebastian and El Mamon.

Six specimens, as follows: Bonda, Nov. 11 and 30, Dec. 1 and 19, and Feb. 8; Cienaga, Sept. 13.

374. [*Cinclus rivularis* Bangs.]

Cinclus rivularis BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 105. Chirua and Paramo de Chiriqua, alt. 7000-12,000 ft.]

375. [*Polioptila nigriceps* Baird.]

Polioptila nigriceps SALV. & GODM. Ibis, 1880, 116. Valencia.]

376. *Polioptila bilineata* (Bon.).

Polioptila bilineata BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144. Santa Marta.

One specimen, Bonda, Sept. 18.

377. [*Platycichla flavipes carbonaria* (Licht.).

Platycichla flavipes carbonaria BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 108. Chirua, La Concepcion, and San Miguel.]

378. *Merula olivatra* (Lafr.).

Merula olivatra BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 107. La Concepcion.

Eight specimens, taken as follows: Valparaiso, March 25-April 11; Las Nubes, Dec. 10.

The females wholly lack the black on the throat and breast and have the head brown, nearly concolor with the back, thus entirely lacking the black head of the males. In some females the throat and breast feathers are more or less edged with dusky. In young males the black feathers of the throat and breast are more or less edged with olive brown.

379. [*Merula incompta* Bangs.]

Merula incompta BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144. Santa Marta.]

380. [*Merula gigas cacozela* Bangs.]

Turdus gigas SALV. & GODM. Ibis, 1879, 198. San Sebastian.

Merula gigas cacozela BANGS, Proc. Biol. Soc. Wash. XII, 1898, 181 (Macotama); *ibid.* XIII, 1899, 107 (San Miguel, Paramo de Chiriqua, and Paramo de Macotama); *ibid.* Proc. N. Engl. Zool. Club, I, 1899, 80 (San Sebastian and El Mamon).]

381. *Merula grayi lurida* (Bon.).

Turdus grayi SALV. & GODM. Ibis, 1880, 115. Santa Marta.

Fifteen specimens, Bonda, taken as follows: June 23, July 5

(juv.) and 14, Aug. 2 and 3 (2 juv.), Sept. 18, Dec. 8-10, Feb. 25. The series contains 3 young specimens in spotted plumage.

This species is apparently resident in the coast district, but is probably absent from the region above 5000 feet, as no specimens were taken there by Mr. Smith's collectors, nor is it included in Mr. Bangs's list of the species obtained by Mr. Brown.

The present series indicates the necessity of recognizing Bonaparte's *Planesticus luridus* as at least a well-marked subspecies of *M. grayi*. Only one of the 12 specimens at all closely resembles true *grayi*, which is perhaps sufficient to imply their probable intergradation.

382. *Merula albiventris fusa* Bangs.

Merula albiventris fusa BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 107. Chirua (type locality), La Concepcion, San Miguel, and San Francisco.

Six specimens, Bonda, Dec. 16 and 22, Jan. 20, Feb. 22, and Aug. 1.

383. *Merula phæopyga minuscula* Bangs.

Merula phæopyga minuscula BANGS, Proc. Biol. Soc. Wash. XII, 1898, 181 (Palomina and Pueblo Viejo); *ibid.* XIII, 1899, 108 (La Concepcion and San Miguel).

Seven specimens: Valparaiso, 6 specimens, all adult, March 9-29 and June 6. Also a single specimen partly in first (nestling) plumage, Bonda, Aug. 27.

In this specimen the feathers of the head, neck, interscapulars, scapulars, and wing-coverts have narrow ochraceous shaft-lines, broadening at the tip of the feather on the scapulars and wing-coverts, particularly on the latter, where they take the form of wedge-shaped spots. The breast feathers are buff, broadly tipped with blackish, and the abdominal region has narrow indistinct dusky cross-bars. The bill is deep black, faintly brownish at the base of the lower mandible.

384. *Hylocichla fuscescens* (Steph.).

Three specimens, Bonda, Oct. 5, 7, and 13.

385. *Hylocichla ustulata swainsoni* (Cab.).

Turdus swainsoni SALV. & GODM. Ibis, 1880, 115. Minca, Jan. 22.

Hylocichla ustulata swainsoni BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 107. Chirua, Feb. 16.

Two specimens, Bonda, Nov. 5 and January.

386. *Hylocichla aliciae* (Baird).

Turdus aliciae BANGS, Proc. Biol. Soc. Wash. XII, 1898, 144. Santa Marta.

Sixteen specimens, as follows: Bonda, Oct. 7–Nov. 28; Las Nubes, Dec. 17; Onaca, Dec. 26 and 28; Valparaiso, March 18 and 23 and April 7.

This is evidently a winter resident, arriving early in October and remaining till into April.

387. *Catharus fuscater* (Lafr.).

Catharus fuscater BANGS, Proc. Biol. Soc. Wash. XIII, 1899, 108. Chirua.

Nine specimens, El Libano, April 29–May 2.

The males are darker throughout than the females, with a much blacker head.

388. [*Catharus aurantiirostris* (Hartlaub).]

Catharus aurantiirostris BANGS, Proc. Biol. Soc. Wash. XII, 1898, 160 and 181. Pueblo Viejo and Palomina.]



PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs,' forms a separate and complete monograph, with numerous plates.

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology (not yet completed).

The Jesup North-Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingstone Farrand. Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	4.75	" IX, 1897.....	4.75
" III, 1890-91.....	4.00	" X, 1898.....	4.75
" IV, 1892.....	4.00	" XI, Part I, 1898.....	1.25
" V, 1893.....	4.00	" " II, 1899.....	2.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00		

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris;

R. FRIEDLÄNDER & SOHN, Berlin;

and at the Museum.

*Note on the Generic Names Didelphis
and Philander*

By J. A. ALLEN

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XIII, ARTICLE XV, pp. 185-190.

New York, Oct. 12, 1900.

The Knickerbocker Press, New York

Article XV.—NOTE ON THE GENERIC NAMES
DIDELPHIS AND PHILANDER.

By J. A. ALLEN.

Mr. James A. G. Rehn, in the 'American Naturalist' for July, 1900 (Vol. XXIV, pp. 575-578), discusses the standing of the Linnæan genera *Myrmecophaga* and *Didelphis*. While I agree with his conclusions in respect to the former, I cannot share his view with regard to the latter. In the case of *Didelphis*, he claims with Alston (Biolog. Centr.-Amer., Vol. I, p. 196, footnote) and the present writer (Bull. Am. Mus. Nat. Hist., Vol. IX, 1897, p. 43) that *D. marsupialis* "is unrecognizable." Mr. Alston adopted the name *D. virginiana* Kerr for the North American Opossum as being "the earliest name which can be clearly and certainly identified with this species"; he adding: "Linnæus's *D. marsupialis* (Syst. Nat. [ed. 12], I, p. 71) is evidently founded on a confusion of the North American Opossum with some of the South American forms, probably *D. cancrivora* Gmelin; and the same remark applies to descriptions of his earlier followers. In such a case it seems advisable to relinquish the uncertain title altogether." In 1897 (*l. c.*) I said: "The name *marsupialis* is here recognized only provisionally, and in the belief that it should be discarded as indeterminable, in view of the fact that several quite distinct forms have been included under it. The original Linnæan species *marsupialis* was intricately composite. . . . If we take Linnæus's diagnosis (Syst. Nat., ed. 10, 1758, p. 55) as the basis of the name, it seems to point to *D. aurita* rather than to *D. virginiana*—to an animal with a tail as long as the body and the ears black, tipped with white. It is clearly not *D. karkinophaga*."

As the above quotations show, Mr. Rehn is perhaps fairly justified in citing Alston and myself in support of his side of the question. But since, through Mr. Rehn's action in the matter, the case has become more serious, it seems desirable to go once more over the subject, for his position, if really tenable, involves a most serious overturn of names long currently accepted. As stated by Mr. Rehn, three of Linnæus's four valid species were

successively removed from the Linnæan genus *Didelphis* as types of new genera, namely *D. philander*, as the type of the genus *Philander*; *D. marmosa*, as the type of the genus *Marmosa*; and *D. opossum*, as the type of the genus *Metachirus*; leaving only *D. marsupialis*, which is claimed to be unrecognizable. As *D. opossum* was the last recognizable species removed from the genus *Didelphis*, this species, according to prevailing rules of nomenclature, he claims must be taken as the type of *Didelphis*, and *Sarigua* (Muirhead, "1819"¹) be employed for the group of species for which *Didelphis* has been hitherto almost universally employed. It therefore seems almost as desirable to conserve Linnæus's species *marsupialis* as his genus *Didelphis*.

It may be noted, first, that there is no doubt whatever that the name *marsupialis* applies almost strictly to the large Opossums of the *virginiana* type, of both North America and South America. The trouble is to restrict the name satisfactorily to some one form of the group of species and subspecies described since Linnæus published the name *marsupialis*. It is a recognized rule of nomenclature that a name applied to a composite group, whether specific or generic, must be conserved for some one of its components when the group is later subdivided. Where a diagnosis is imperfect or indecisive, as in the case of a large proportion of the species of the older authors, including Linnæus, it is necessary, in attempting to restrict the name to some particular form included in a composite group, to examine the references on which the name was originally based, as well as the diagnosis, the former often being of far greater importance than the latter.

In this case Linnæus's first reference is to the *Philander* of Seba ("Mus. I, p. 64, t. 39"), which is not an American animal, but a species of *Phalanger* from Amboyna, and hence not the animal called *Philander* from South America.

Linnæus's second reference is to Tyson. Dr. Tyson's first memoir is entitled 'Carigueya, seu Marsupiale Americanum; or, The Anatomy of an Opossum,' published in the 'Philosophical

¹ Mr. Rehn says: "The large opossums formerly called *Didelphis* require a name, and the oldest one available is *Sarigua* Muirhead, with *S. virginiana* as the type. The complete reference is *Sarigua* Muirhead, Brewster's *Amer. Edition Edinburgh Encyclopædia*, Vol. XII, Part II, p. 505, 1819."

This reference, however, is erroneous as to date, and misleading as to the title of the work cited. The correct citation would be Brewster's *Edinburgh Encyclopædia*, Amer. Ed., Vol. XII., Pt. 2, p. 505, 1832. The important error is in the date, which is 1832 instead of 1819. The reference to the original edition, where the matter is the same, is Brewster's *Edinburgh Encyclopædia*, Vol. XIII, p. 429, 1830—the date being in this case 1830 instead of 1832.

Transactions' in 1698 (Vol. XX, No. 239, pp. 105-164, with 2 pll.), and based on an animal "brought alive from Virginia," of which he gave not only a scientific and detailed account of its anatomy but also of its external characters. Linnæus's reference is to Tyson's second memoir on the same animal, published six years later (Philos. Trans., Vol. XXIV, 1704, pp. 1565-1575), which is followed by a memoir by Dr. Cowper, on 'The Anatomy of those Parts of a Male Opossum that differ from the Female' (*ibid.*, pp. 1576-1590, with 1 pl.). "This male Opossum," says Dr. Cowper, "as well as the female dissected by Dr. Tyson, was brought from Virginia, and presented to the Royal Society." Then follow references to DeLaet, Marcgrave, Piso, and Hernandez, which mainly relate to the large South American Opossums, but not very distinctly to any particular form of this varied group. In the reference to Tyson we have distinctly a reference to the Virginia Opossum, and to that member of the Opossum group only. It therefore seems consonant with the rules of nomenclature for such cases, as well as with current usage, to fix the name *Didelphis marsupialis* upon the Virginia Opossum, which thus becomes, by elimination, the type of the Linnæan genus *Didelphis*. Then we have, in chronological sequence, *Didelphis karkinophaga* Zimmermann (1780), based exclusively on 'Le Crabier' of Buffon (Suppl., Vol. III, p. 272, pl. liv) from Cayenne, for the form from northeastern South America; *D. azaræ* Temminck (1826¹) for the animal of Paraguay and Bolivia, and *Didelphis aurita* Wied (1826) for the form from southeastern Brazil. Later followed *Didelphis californica* and *D. breviceps* (1833), based on specimens from Mexico.

The name *Sarigua*, in the French vernacular form *Sarigues*, was used by G. Cuvier (Tabl. élém. de l'Hist. Nat. Anim., an 6 [=1798], p. 124) as early as 1798 for the American Marsupials collectively, as the name of the first of his three divisions of *Didelphis* Linn., the others being, respectively, *Dasyures* and *Phalangers*, for the Australian Marsupials. Desmarest used the term *Sarigue* as a vernacular equivalent of *Didelphis* Linn. in

¹ As there seems to be no doubt that the second volume of Wied's 'Beiträge zur Naturgeschichte von Brasilien' was published in 1826, it seems certain that that part of Temminck's 'Monographies de Mammalogie' treating of the Opossums should bear at least as early a date, as Wied cites this part of Temminck's work, giving page references. Thus *aurita* has evidently not "a year's clear priority over *azaræ*," as stated by Alston (Biol. Cent.-Am., p. 197), but is of somewhat later date.

1804 (Nouv. Dict. d'Hist. Nat., Vol. XXIV, 1804, Mamm., p. 19), whence Muirhead evidently obtained it, as he ascribes the name to Desmarest.¹ The name *Sarigue* was used in a vernacular sense by Buffon (Hist. Nat., Vol. X, p. 279 *et seq.*) in 1763, evidently as a modification of *Carigüeya* of Tyson, who derived it from still earlier writers.

The genus *Philander* is usually ascribed to Tiedemann (1808), but as used by this author it is a pure synonym of *Didelphis* Linnaeus, being merely a renaming of the genus, as long since pointed out by Mr. Thomas (Cat. Marsup. and Monotr. Br. Mus., 1888, p. 336, footnote). The name *Philander*, however, was first employed in a generic sense by Brisson in 1756, who included under it all of the Marsupials known to him, and again in 1762 for the same species. The first use of the name *Philander* by Brisson being previous to 1758, the name is not tenable from its first date, but would be from 1762, had not Linnaeus in the meantime established the genus *Didelphis*, for practically the same species.² The exception is a species of *Phalanger* from the East Indies. According to current usage in similar cases,³ *Philander* should be thrown out as untenable for any generic group, unless, by the process of elimination, it can be fixed upon the group to which Storr in 1780 gave the name *Phalanger*. This would, of course, do away with any availability it might otherwise have in American mammalogy.

Dr. J. E. Gray in 1843 (List Mamm. Br. Mus., 1843, pp. xxi, 100) again made use of the name "*Philander* Brisson" for such a heterogeneous assemblage as *D. nudicauda* Desm., *D. karkino-*

¹ The manner in which Dr. Muirhead used the name *Sarigua* is shown by the following transcript from his article on the "Suborder Pedimana."

"1. Genus SARIGUA, Desmar. DIDELPHIS, Lin. . . . [Here follows a short diagnosis of the genus.]

"1. *S. marsupialis*, *Didelphis marsupialis*, *cancrivora*, Lin. *Amboyna*, or *Molucca opossum*. Eight teats within the pouch. 2. *S. virginiana*, *Didelphis virginiana*, Pennant and Geoff. *Long-haired opossum*. Body covered with long brown hair; head white with a brown spot. 3. *S. opossum*, *Didelphis opossum*, Lin. *Common* or *Virginian opossum*. Half of the tail hairy; a light colored spot above the eyes. 4. *S. murina*, *Didelphis murina*, Lin. *Murine opossum*, or *marmose*. Tail hairy at the base. 5. *S. cayopolin*, *Didelphis cayopolin*, and *dorsigera*, Lin. *Mexican* or *Merian opossum*. Tail longer than the body, margin of the orbits black. 6. *S. brachyura*, *Didelphis brachyura*, Lin. *Short-tailed opossum*. Tail short; ears naked; body rufous. 7. *S. memmina*, *Didelphis memmina*, Cuv. *Yapock* or *Little otter of Guiana*. Tail hairy above, naked beneath, and nearly as long as the body. 8. *S. crassicaudata*, *Thick-tailed opossum*. Tail large and strong; upper parts of the body of a bright cinnamon hue, the under parts of a bright gray. 9. *S. pusilla*, *Didelphis pusilla*, Desmar. *Dwarf opossum*. Body of a leaden hue, and whitish underneath.

"*S. opossum*. (Pl. ccclv. Fig. 20.) This species is about the size of a small cat . . ." Then follows, under this name, about one column on the North American Opossum.

² Cf. Merriam, Science, N. S., II, No. 39, p. 418, Sept. 27, 1895.

³ See the treatment of such nearly parallel cases as *Myodes* Pallas and *Cuniculus* Wagler by Mr. G. S. Miller, Jr. (N. Am. Fauna, No. 12, 1896, pp. 15 and 16).

phaga Zimmermann, *D. murina* Linn., etc., leaving *D. virginiana* and *D. azaræ* in *Didelphis*. No type was designated, but the first species was *D. nudicauda* Desm., which later became the type of *Metachirus* Burmeister. Still later the name *Philander* was used by Burmeister (1856) in a generic sense with *D. philander* Linn. as the type.

As already shown, however, both *Sarigua* and *Philander* are properly synonyms of *Didelphis*, and as a new name should be provided for the genus of late recognized under the name *Philander*, I suggest **Caluromys**, with *Didelphis philander* Linn. as type.

Caluromys will include not only the species now usually referred to *Philander*, but also *Didelphis cinerea* Temminck, now commonly placed in *Marmosa*; as *D. cinerea* agrees with the former not only in external characters, as notably in the heavily furred basal portion of the tail, but also in the principal characters of the skull, as in the presence of well-developed postorbital processes and in the absence of large vacuities in the posterior palate, in comparison with the species of the *Marmosa* group. The forms of *Caluromys* will thus stand as follows:

1. *Caluromys philander* (Linn.). Guiana, Venezuela, and northeastern Brazil.
2. *Caluromys cicur* (Bangs). Northeastern Colombia.
3. *Caluromys affinis* (Wagner, ex Natterer MS.). Matto Grosso, Brazil.
4. *Caluromys trinitatis* (Thomas). Trinidad.
5. *Caluromys derbianus* (Waterhouse). Ecuador (?); Central America.
6. *Caluromys derbianus ornatus* (Tschudi). Peru.
7. *Caluromys laniger* (Desm.). Paraguay.
8. *Caluromys laniger guyanus* (Thomas). Western Ecuador.
9. *Caluromys laniger pallidus* (Thomas). Northwestern Panama.
10. *Caluromys cinereus* (Desm.). Southeastern Brazil.

11. **Caluromys alstoni**, sp. nov.

Didelphys cinerea, ALSTON, Biol. Centr.-Am. Mamm. 199, pl. xxi (Oct. 1880). Not of Temminck.

Type, No. $\frac{11790}{18210}$, ♂ ad., Tres Rios, Costa Rica, Aug. 17, 1893; coll. George K. Cherrie. Cotypes, 1 ♀ ad. and 4 young, one fourth to one half grown.

Larger than *C. cinereus*, with the tips of the hairs of the dorsal surface dark chestnut brown instead of rufous brown, and the lower parts more strongly yellowish. Head and body in male, 180 mm. ; tail, 250 ; hind foot (without claws), 25.

Known only from Costa Rica.

It may be of interest to state in this connection that what may be fairly considered as the type of *Didelphis cinerea* Temminck — the mounted specimen sent to Temminck by Wied (*cf.* Wied Beiträge zur Naturg. von Bras., II, 1826, p. 409, footnote) for description — is now in this Museum, it having been received as a part of the Maximilian Collection, purchased in 1870. It is in poor condition, having suffered from long exposure as a mounted specimen, but it still has attached to it Wied's original label, which bears the legend : "No. 33, Mas. Jupatí."¹

It is without doubt the type of Wied's description of the species (*l. c.*, pp. 406-411), and certainly a cotype of Temminck's original description (Monog. de Mamm., 1825, p. 46) ; he must, however, have described the female from another specimen, from Bahia, loaned him, as he states, by the Vienna Museum.

¹ Says Wied, "Dieses Beutelthier lebt im östlichen Brasilien. Ich erhielt es in den Wäldern des Mucuri zu Morro d' Azara, wo man es unter der Benennung Jupatí mit den übrigen verwandten Arten verwechselt" (*l. c.*, p. 410).

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs,' forms a separate and complete monograph, with numerous plates.

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll: i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingstone Farrand. Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

BULLETIN.

Volume I, 1881-86.	Price, \$5.50	Volume VIII, 1896.	Price, \$4.00
" II, 1887-90.	" 4.75	" IX, 1897.	" 4.75
" III, 1890-91.	" 4.00	" X, 1898.	" 4.75
" IV, 1892.	" 4.00	" XI, Part I, 1898.	" 1.25
" V, 1893.	" 4.00	" " II, 1899.	" 2.00
" VI, 1894.	" 4.00	" XII, 1899.	" 4.00
" VII, 1895.	" 4.00		

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

8

*Descriptions of New American
Marsupials.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,
VOL. XIII, ARTICLE XVI, pp. 191-199.
New York, October 23, 1900.

The Knickerbocker Press, New York

Article XVI.—DESCRIPTIONS OF NEW AMERICAN MARSUPIALS.

By J. A. ALLEN.

During the last two years the Museum has received a considerable number of specimens of South American and Central American Marsupials, and in endeavoring to critically determine this material, as well as that previously in the Museum, the following species and subspecies appear to have been hitherto undescribed.

Didelphis pernigra, sp. nov.

Type, No. 16071, ♀ ad., Juliaca, Peru, altitude 7000 feet, Feb. 12, 1900; coll. H. H. Keays.

Entire upper parts, except the head, intense glistening black, the long thick black overhair entirely unmixed with the long, stiff white hairs seen in the *D. marsupialis* group; basal half or more of the soft woolly underfur pale yellowish white, the tips black, the whitish underfur concealed by the thick, heavy coat of black overhair; head white, with three prominent, sharply defined black bands, two of which are lateral, enclosing the eyes and extending from the base of the whiskers to a little behind the eyes, and continued as an ill-defined dusky patch nearly to the ears; the median black band begins as a narrow stripe opposite the anterior margin of the eyes and rapidly widens posteriorly to the nape where it merges with the black of the body; cheeks and throat rusty buff; rest of the lower parts, except the area enclosing the abdominal pouch, buffy white, with the tips of the hairs black, imparting a strong tinge of this color to the ventral surface; pouch clothed within and around its outer border with short crisp woolly hairs of a reddish chestnut tint; ears of medium size, *entirely white*, in striking contrast with the deep black of the upper surface of the body; feet black, the toes dusky brown and nearly naked; tail black for the basal two to three fifths, the rest white.

A young male about one fourth to one third grown differs in no respect in coloration from the adults. None of the specimens show any trace of the long white bristly overhairs so characteristic of the other forms of *Didelphis*.

Measurements.—Type (female), total length, 750 mm.; head and body, 383; tail, 367; hind foot, 65; ear (in dry skin), 26 x 25. A second specimen, also an adult female, measures as follows: Total length, 710; head and body, 343; tail, 367; hind foot, 61.

Skull (of type), total length, 87.5; basal length, 82; nasals, 42; palate, 52; zygomatic breadth, 42.5; mastoid breadth, 28; interorbital breadth in front of postorbital processes, 28.5, behind postorbital processes, 11. The skull of a specimen of *D. karkinophaga* from Trinidad of corresponding age is much

larger, measuring, total length, 99; basal length, 94; nasals, 48; zygomatic breadth, 50. Other female *karkinophaga* skulls from Trinidad are still larger, but otherwise than in size there seems to be no very noticeable difference, except that in *D. pernigra* the bones are very smooth, dense, and heavy in comparison with other *Didelphis* skulls.

Didelphis pernigra is based on two adult females and one young male. In style of markings and coloration they are all remarkably uniform, and appear to be eminently distinct from any other known forms of *Didelphis*.

***Didelphis karkinophaga caucae*, subsp. nov.**

Type, No. 14192, ♀ ad., Cali, Upper Cauca Valley, Colombia; coll. J. H. Batty.

Similar to *D. karkinophaga* from Trinidad, but darker colored throughout. Underfur whitish or yellowish white, more or less hidden by long black-tipped hairs, intermixed with long, wholly white bristly hairs, the abundance of the latter variable in different specimens; ventral surface buffy white, often inclining to rusty, the hairs tipped with blackish, so as often to give a grizzled blackish effect, wholly lacking in *karkinophaga*; head with a narrow blackish eyering, and no other distinct blackish markings, but with a general grizzled blackish effect over the whole head, the longer hairs being tipped with black, instead of almost wholly whitish as in *karkinophaga*; ears very large and wholly deep black; tail particolored, black at base and white for about the apical half.

Measurements.—Total length (of type), 740 mm.; head and body, 370; tail, 370; hind foot, 58; ear (in dry skin), 32 x 32. A male (young adult), measures, total length, 770; head and body, 410; tail, 360; hind foot, 53. Judging by the material in hand, skulls and skins (eleven specimens), the skins mostly without measurements of the fresh specimen, the Cauca Valley form of *Didelphis* is considerably smaller than the Trinidad animal, with a relatively shorter tail.

Skull rather broader than in true *karkinophaga*, but not otherwise different. Total length (of type), 94; basal length, 87; nasals, 45; palate, 55; zygomatic breadth, 50; interorbital breadth in front of postorbital processes, 19, behind postorbital processes, 11.

I have been rather surprised to find that series of specimens of the *karkinophaga* type of *Didelphis* from, respectively, the Island of Trinidad, Santa Marta, Colombia, and the Upper Cauca Valley, Colombia, present color differences that are obvious on even superficial inspection. These series number from eight to fourteen specimens each, and are all referable at a glance to their respective series; these forms hence seem entitled to recognition in nomenclature. The Santa Marta series

described below, is recognizable not only through differences of color, but in having the ears at least one third smaller than in either of the other forms. In each form the ears are wholly black. The Trinidad form is much the larger, as shown by the following average measurements of four adult males and three adult females. *Males*: Total length, 874 mm.; head and body, 452; tail, 446; hind foot, 60.5. *Females*: Total length, 807; head and body, 406; tail, 401; hind foot, 57. While in the average the tail measures less than the head and body, there are several exceptions where the tail considerably exceeds the head and body, as in No. 6063, ♂, where the tail measures 465 and the head and body 455; No. 6051, ♂, tail 425, head and body, 385; and No. 7732, ♀, tail 430 and the head and body 400.¹ It is therefore doubtful whether in any of the forms of *Didelphis* the tail regularly exceeds the head and body in length.

There is also considerable variation in respect to the prevalence of black or white hairs in the pelage of the dorsal surface in all the forms, in some examples the long white overhairs are so abundant as to render the prevailing color whitish; in other examples they are nearly absent, leaving the prevailing color blackish.

The color differences in these three forms are quite as strongly shown in young specimens, not more than one quarter grown, as in the adults.

***Didelphis karkinophaga colombica*, subsp. nov.**

Type, No. 15453, ♂ ad., Bonda, Santa Marta, Colombia, April 19, 1899; coll. H. H. Smith.

Similar to *D. karkinophaga caucae* but darker throughout, the underfur a deeper shade of buffy white, and the ears much smaller. Above the long overhair is more abundant and of a brownish black, often heavily mixed with stiff, longer white hairs, but frequently the latter are wholly wanting; head without very distinct markings but with a tendency to an indistinct median stripe and a lateral one on each side, more distinctly developed behind the eyes; whole top of the head, however, with the hairs more or less tipped with brownish black, giving a general blackish grizzled effect; ventral surface more deeply buff, overlaid with a blackish grizzle produced by black-tipped hairs; ears and feet brownish black; tail black for about the basal half, the rest yellowish white.

¹ See table of measurements given in this Bulletin, Vol. IX, 1897, p. 25.

Measurements.—Total length (of type), 824 mm.; head and body, 371; tail, 453; hind foot, 57; ear (in dry skin), 26 x 26 (as against 32 x 32 in *D. karkinophaga* and *D. k. cauce*).

Skull, total length, 94; basal length, —¹; nasals, 46; palate, 54; zygomatic breadth, 53; mastoid breadth, 27; interorbital breadth in front of postorbital processes, 19, behind postorbital processes, 11. Another skull, of a very old male, measures, total length, 117; basal length, 109; nasals, 55; palate, 66; zygomatic breadth, 61; mastoid breadth, 35; interorbital breadth in front of postorbital processes, 23, behind postorbital processes, 10.5.

As shown by the subjoined table, the Santa Marta form averages considerably smaller than the Trinidad form.

EXTERNAL MEASUREMENTS OF *Didelphis karkinophaga colombica*.

Mus. No.	Sex.	Total Length.	Head and Body.	Tail.	Hind Foot.
14613	♂	710	355	355	57
15456	♂	980	497	483	68
15453	♂	824	371	453	57
14615	♂	786	456	330	57
14614	♀	863	406	457	54
15452	♀	812	406	406	57
15455	♀	673	318	355	57
Average of 4 males		825	420	405	60
Average of 3 females		783	377	406	56

***Metachirus fuscogriseus*, sp. nov.**

Type, No. $\frac{9930}{2283}$, ♂ ad., Central America; presented by Albert Smith.

Above dusky, the tips of the hairs silvery, the general effect being blackish with a grayish wash; whole top of the head and a more or less distinct median band black; sides lighter with more gray, the color of the dorsal surface sharply defined against the pale yellowish white of the ventral surface; supraocular spots pale yellowish white, with a narrow band of the same color at the base of the ears above, and a broader band of the same below the ears; cheeks, throat, and fore neck rather more strongly yellowish white than the rest of the ventral surface; outer surface of fore and hind limbs like the sides but rather paler; the inner surface of the limbs like the ventral surface; feet nearly naked, brownish both above and below; ears apparently flesh-color in life, broadly edged with dark brown; tail heavily furred for about the first (proximal) inch and a half; the rest naked, dark brown basally, gradually becoming lighter apically, the last two or three inches being light brown, perhaps flesh-color in life at the tip.

¹ Base of skull imperfect.

Measurements.—Total length, 534 mm.; head and body, 251; tail, 283; hind foot, with claws, 39, without claws, 36.

Skull, total length, 66; basal length, 62; length of nasals, 32; upper tooth-row from canine to posterior edge of last molar, 25.5; palatal length, 38; zygomatic breadth, 32; mastoid breadth, 19; least interorbital breadth, 8.5.

This species is nearly related to *Metachirus quica* (Temminck, ex Natterer, MS.), of which it is the Central American representative. The type locality of *M. quica* may be considered as the coast region of Brazil just south of Rio de Janeiro, Temminck having apparently described the species from Natterer's specimens collected there, he also adopting Natterer's manuscript name. It rather closely agrees with Mr. Thomas's description of *Didelphis (Metachirus) opossum* (Cat. Marsup. and Monotr. Br. Mus., 1888, p. 329), to which he there refers *D. quica*, Temminck. *Metachirus opossum* (Linn.), however, judging from Seba's description, on which Linnæus's name was exclusively based, was a very different animal, especially as distinguished from *D. quica* by Temminck in his monograph of this group (Monogr. de Mamm., I, p. 41); the upper parts being described by Seba as "chatain obscur" and by Temminck as "roux de rouille ou canelle." In either case the type locality is most probably Surinam; Temminck's specimens were, he states, from Surinam, and Seba's specimens were from either Surinam or eastern Brazil. In providing, for convenience, a *patrie* for *D. opossum*, Surinam may be properly taken as its type locality.

The locality of the type of *M. fuscogriseus* is unfortunately not definitely known; the specimen was found in a bunch of bananas in unloading a fruit steamer from a Central American port, most likely Colon, after its arrival alive in New York harbor. According to Alston (Biol. Centr. Am. Mam., p. 199) this form of Opossum ranges from southern Mexico to Costa Rica.

Metachirus tschudii, sp. nov.

Didelphys myosurus TSCHUDI, Fauna Peruana, I, 1844, 145. Not of Temminck.

Type, No. $\frac{11815}{10167}$, ♀ ad., Guayabamba, Peru, altitude 5500 feet, August 30, 1894; coll. O. T. Baron.

Above yellowish gray-brown, darker (distinctly black) along the median line, more grayish over the shoulders, and more yellowish brown on the sides, with a decided rusty tinge on the hinder part of the sides, from the region of the

loins posteriorly ; whole upper surface of the head, excepting the 'eye-spots,' deep brownish black, passing into deep black on the nape, where it joins the well-defined black dorsal line ; cheeks and supraloral spots straw-color ; posterior base of the ears fulvous gray, forming an ill-defined patch ; outer surface of the limbs in general like the sides of the body, passing into dusky on the forearms ; whole lower surface pale yellowish white, this tint a little stronger on the breast and throat ; ears light brown, apparently flesh-color in life for the basal fourth ; fore feet brown proximally, toes nearly bare, flesh-color ; hind feet dark brown, the toes sparsely haired, light brown ; tail dark brown proximally on the upper surface only, becoming gradually lighter towards the tip, the apical third being dull whitish ; less than half an inch of the basal portion is clothed with short fur like that of the adjoining portion of the body. The pouch is indicated in the skin by an area about 50 mm. in length by about 25 mm. in width clothed with short, crisp, woolly hairs of a dark rusty brown color, in strong contrast with the rest of the ventral surface. The number of mammæ cannot be distinguished.

Measurements.—Total length, 500 mm. ; head and body, 240 ; tail, 260 ; hind foot, 43.

Skull, total length, 55 ; basal length, 51 ; nasals, 26 ; palate, 30 ; zygomatic breadth, 26.5 ; mastoid breadth, 21.5 ; least interorbital breadth, 14.5. The skull is of the usual form for the genus and calls for no special comment.

This species is distinctly indicated by Tschudi (*l. c.*), under the name "*Didelphys myosurus* Temm." After citing Temminck's description he notes that his specimens do not wholly agree in coloration with examples from Guiana and Surinam, they being much more intensely colored, as is the case with many other Peruvian animals in comparison with their east coast representatives. The difference is often so considerable, he says, as to many times tempt one to recognize them as distinct species. *Metachirus tschudii* is undoubtedly the western representative of Temminck's *D. myosurus*, which, rightly or wrongly, is commonly synonymized with E. Geoffroy's *D. nudicaudata*.

***Metachirus nudicaudatus colombianus*, subsp. nov.**

Type, No. 15448, ♂ ad., Donamo, Santa Marta District, Colombia, April 20, 1899 ; coll. H. H. Smith.

Above dark yellowish brown, strongly varied with black, which forms a fairly well defined blackish median area ; sides uniform yellowish brown ; head brownish black, passing into black on the top of the head and nape and around the eyes, which are broadly margined with black ; supraocular spots deep buff ; fur at base of the ears above rusty buff ; cheeks buff, a little paler than the eye-spots ; below white, tinged faintly with yellowish, more strongly

on the fore neck and throat; ears (in dry skin) pale brown; outer surface of fore and hind limbs like the sides of the body but much less fulvous and tinged with gray; fore and hind feet brown with a tinge of grayish fulvous, the toes lighter and very thinly haired; tail blackish brown above at the extreme base, gradually becoming lighter, the lower surface throughout and the apical two fifths whitish; it is clothed with thick fur like that of the body for about one inch at the base.

Measurements.—Total length, 606 mm.; head and body, 296; tail, 310; hind foot, with claws, 45, without claws, 41.

Skull, total length, 59; basal length, 53; length of nasals, 27.5; palatal length, 31; zygomatic breadth, 29; mastoid breadth, 18.2; least interorbital breadth, 9.3.

Differs from *M. nudicaudatus* (type locality Cayenne) in its darker coloration and somewhat larger size.

***Marmosa chapmani*, sp. nov.**

Didelphis (Micoureus) murina ALLEN & CHAPMAN, Bull. Am. Mus. Nat. Hist. V, 1893, 230. Not of Linnæus and later authors.

Type, No. $\frac{7666}{8053}$, ♂ ad., Caura, Trinidad, April 7, 1894; coll. Frank M. Chapman.

Very much larger than *M. murina* and much darker colored. Above dark yellowish brown; below pale buffy white; black ocular spot large, extending from the base of the whiskers posteriorly nearly to the ear, restricted below the eye to a narrow line, expanded above the eye to a width of 3 to 4 mm., and behind the eye 7 to 9 mm.; nose patch buff, much lighter than the top of the head; ears large, pale brown; feet yellowish, much lighter than the general color above; tail dull brown above, much paler below, hence indistinctly bicolor.

Measurements.—Total length (of type), 376 mm.; head and body, 175; tail, 201; hind foot, 25; ear from notch, 32, from crown (dry skin), 18, by 17 in width. "Sixteen adult males, measured before skinning, range in size as follows: Total length, 361 (340–395) mm.; head and body, 171 (155–189); tail, 190 (175–218); hind foot, 24.4 (20–28); ear, 25 (22–29). Four females measure as follows: Total length, 324 (302–365); head and body, 148 (132–168); tail, 176 (163–197); hind foot, 22 (20–24); ear, 22 (20–23)."—Allen & Chapman, *l. c.*

Skull broad, the zygomatic arches much expanded, the supraorbital bead heavy, expanded at the middle in old skulls into a slight postorbital process. Total length (of type), 41; basal length, 37; nasals, 15; palate, 21; zygomatic breadth, 23; mastoid breadth, 15; interorbital breadth, 8.5.

Since Mr. Chapman and I referred the Trinidad species of *Marmosa* to *M. murina*, the Museum has received examples of true *M. murina* from Brazil and Venezuela. These show that

the Trinidad form—here named *M. chapmani*, in honor of my colleague Mr. Frank M. Chapman, to whom science is so deeply indebted for his researches on the mammals and birds of Trinidad—is a very much larger animal than the true *murina*, and much more deeply colored. Average male specimens of the latter have a total length of about 305 mm., the head and body constituting about 140 and the tail 165, as against 361, 171, and 190 for *M. chapmani*.

***Marmosa klagesi*, sp. nov.**

Type, No. 16121, ♂ ad., Ciudad Bolivar, Venezuela, Oct. 26, 1899; coll. Samuel M. Klages, after whom the species is named.

Above dull grayish brown with a dark rufescent tinge, the general effect approaching dull russet brown; space between the eyes but little lighter than the crown; dark loreal spot enclosing the eye deep black, extending from the base of the whiskers only to the posterior canthus of the eye, below the eye reduced to a narrow line, but above the eye widening so as to occupy nearly one third of the space between the eyes; whole ventral surface pale yellowish white, brighter on the chest, fore neck, and throat; ears brown, much darker than in *M. murina*; fore feet pale yellowish brown; tarsi dull brown, the toes much lighter.

Measurements.—Total length of type, 325 mm.; head and body, 155; tail, 170 (collector's measurements from the fresh specimen); ear (in dry skin) 16 x 14; hind foot, 18.

Skull, in size and general form, much as in *M. murina*, but the supraorbital bead is much more expanded laterally, forming an obtuse postorbital process. Total length, 36.5; basal length, 31.5; nasals, 16.5; palate, 18.3; zygomatic breadth, 20.5; mastoid breadth, 18; least interorbital breadth, 6.3; greatest interorbital breadth, 8.6.

Marmosa klagesi is based on three specimens, all males, two of which are adult and the other about one third grown. The young specimen scarcely differs in any respect in coloration from the adults; the pelage, however, is softer in texture, or less firm and velvety. Even at this early age the skull shows an incipient supraorbital bead. The species seems to be very distinct from any previously described. It is smaller than *M. chapmani*, and differs from it markedly in coloration and cranial characters.

***Thylamys keaysi*, sp. nov.**

Type, No. 16068, ♂ ad., Juliaca, Peru, altitude 6000 feet, Jan. 8, 1900, coll. H. H. Keays, for whom the species is named.

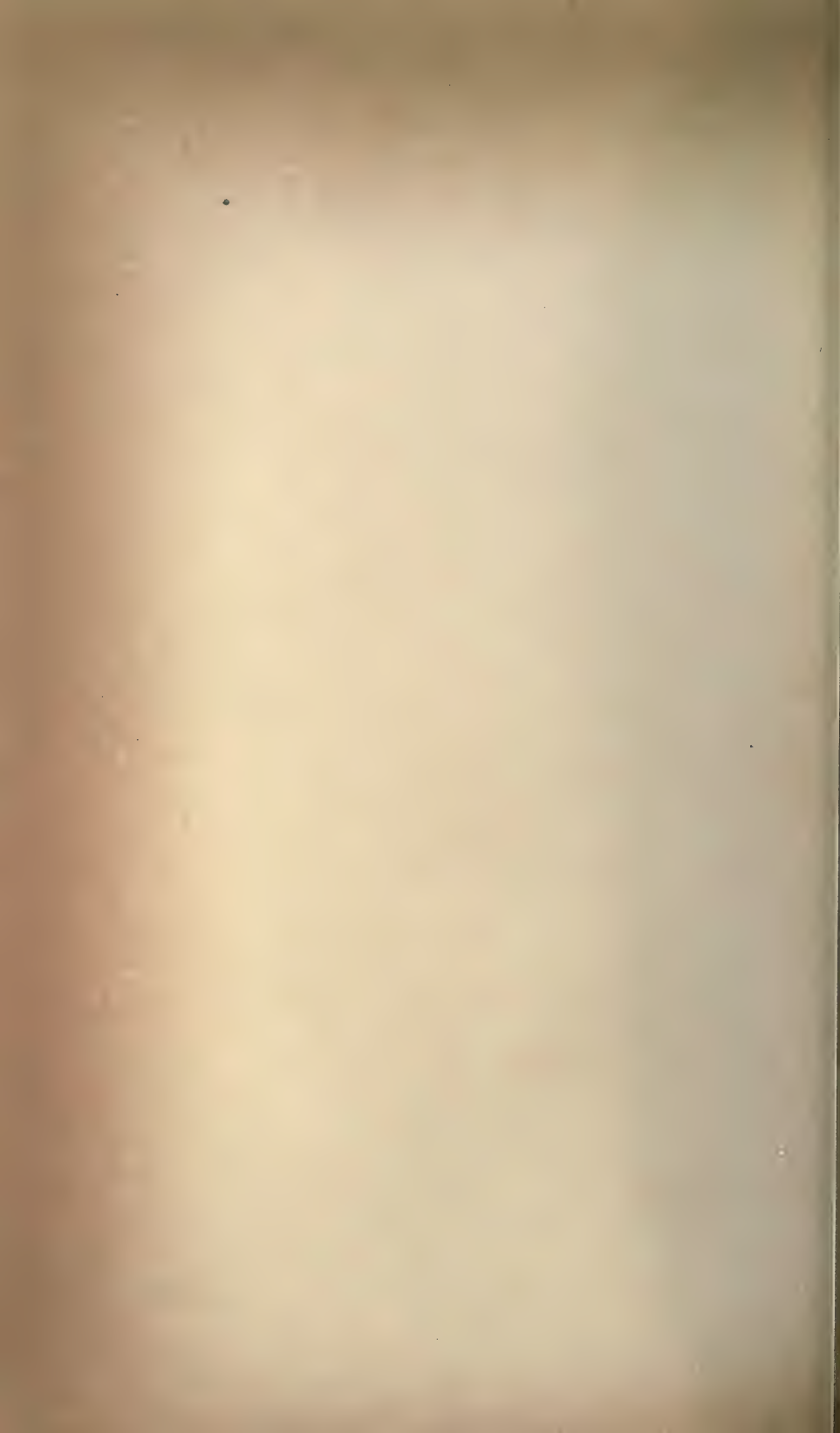
Above dark reddish brown suffused with blackish ; sides lighter and more rufescent ; ventral surface pale buffy white ; nose patch but little lighter than the top of the head ; ocular patch deep black, barely enclosing the eye posteriorly, and extending as a broad band to the nose ; cheeks pale buff ; ventral surface dull yellowish white ; ears blackish ; feet blackish brown, the toes lighter ; tail rather light brown, darkest proximally on the upper surface, the lower surface and the apical third almost flesh-color.

Measurements. — Type (collector's measurements), total length, 355 mm.; head and body, 151 ; tail, 204 ; hind foot, 22 ; ear (in dry skin), 15 x 14.

Skull long and narrow, zygoma very little expanded ; nasals narrow, very slightly expanded posteriorly ; interorbital region flat, cylindrical ; supraorbital bead very slightly developed, and present only in very old specimens. Total length, 39.5 ; basal length, 36 ; nasals, 19 ; palate, 21 ; zygomatic breadth, 20 ; mastoid breadth, 13 ; interorbital breadth, 7.7.

This species is represented by three specimens, an 'old adult' male (the type), a 'young adult' male, and a 'young adult' female. The two males present practically the same measurements ; the female is much smaller than the males, measuring as follows : Total length, 317 ; head and body, 132 ; tail, 185 ; hind foot, 17. The female has no pouch ; three nipples are clearly visible on the left side of the inguinal region ; on the right side the skin is not in good condition.

Thylamys keaysi is easily recognized by its dusky brown color and very long tail, which is fully one fourth longer than the head and body. Its long, narrow skull, the nearly smooth edges of the interorbital region, and the very slight posterior widening of the nasals seem to ally it more nearly with the *Thylamys* group than with the typical forms of *Marmosa*. In coloration it also resembles *T. carri* from Trinidad, but the tone is darker, and it is also a much larger animal.



PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs,' forms a separate and complete monograph, with numerous plates.

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingstone Farrand. Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	4.75	" IX, 1897.....	4.75
" III, 1890-91.....	4.00	" X, 1898.....	4.75
" IV, 1892.....	4.00	" XI, Part I, 1898	1.25
" V, 1893.....	4.00	" " II, 1899	2.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00		

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

4

*On Mammals Collected in Southeastern
Peru by Mr. H. H. Keays, with
Descriptions of New Species.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIII, ARTICLE XVIII, pp. 219-227.

New York, Nov. 16, 1900.

The Knickerbocker Press, New York

**Article XVIII.—ON MAMMALS COLLECTED IN
SOUTHEASTERN PERU, BY MR. H. H. KEAYS,
WITH DESCRIPTIONS OF NEW SPECIES.**

By J. A. ALLEN.

The Museum has recently received two small collections of mammals made by Mr. H. H. Keays, at Juliaca, in southeastern Peru, a little to the westward of Lake Titicaca. Mr. Keays writes: "Our camp is situated in the loop of the Inambary River. The country is very broken, with deep narrow cañons, and is covered with a dense undergrowth of shrubs and vines, with here or there a palmetto or a cedar rising above the surrounding vegetation." He gives the altitude as 6000 feet, and the position as latitude $13^{\circ} 30' S.$, longitude $70^{\circ} W.$

The collections number only 18 species, but contained several not previously described, and others of special interest. The collector's field notes are enclosed by marks of quotation, and are followed by the initials H. H. K., when not otherwise indicated.

1. *Chironectes minimus* Zimmermann.—One specimen, an adult male, taken Jan. 28, 1900. Mr. Keays says it "came into the mill in the flume, the flume at that time taking up all the water of the creek."

2. *Didelphis pernigra* Allen.

Didelphis pernigra ALLEN, Bull. Am. Mus. Nat. Hist. XIII, 1900, 191. Oct. 23, 1900.

Three specimens, as already described (*l. c.*). "Apparently quite common, judging by their signs along the trail. One of these animals had been robbing my traps of their bait for several days when he was caught by one front toe."—H. H. K.

3. *Thylamys keaysi* Allen.

Thylamys keaysi ALLEN, Bull. Am. Mus. Nat. Hist. XIII, 1900, 198. Oct. 23, 1900.

Three specimens, as already described (*l. c.*). "Two of the three specimens were found dead in the trail, having been killed

by some small animal of about their own size. The other was taken in a trap placed in a runway. Their stomachs all contained beetles."—H. H. K.

4. *Lagidium peruanum* Meyen.—One specimen, Tierapata, Peru, Oct. 9, 1899.

"This species is not to be included among the animals of this region [Juliaca]. They exist in suitable places from Lake Titicaca to the Andes. None were seen on the east side of the range, nor have I heard of any on this side. They subsist upon grass and inhabit the rough, rocky cliffs, living in the crevices of the rocks. They are very active, and are able to run up or down a perpendicular rock. They are most active in the morning and evening, though I have seen them at all hours of the day."—H. H. K.

5. *Dactylomys peruanus*, sp. nov.

Type, No. 16060, ♀ ad., Juliaca, Peru, altitude 6000 feet, March 15, 1900; Coll. H. H. Keays.

Pelage soft and full, with long bristly overhairs, but without spines. Above nearly uniform yellowish brown, varied with black-tipped hairs, without tendency to a darker median area; lighter yellowish brown on the sides; sides of nose whitish; top of nose sooty gray; top of head, to a line in front of the ears, gray varied with light yellowish brown; below white, tinged irregularly with pale buff, and with a faint brownish post-pectoral area; the color of the dorsal surface encroaches upon the sides of the abdomen, near the lower edge of which are situated the mammæ, leaving a very narrow white ventral area; base of the tail below bright ferruginous; fore arms and legs concolor with the sides of the body; fore and hind feet grayish brown, becoming lighter on the toes; ears broad, rounded above, brown, nearly naked, with a thin marginal fringe of long bushy hairs; tail considerably longer than the body, for the basal two or three inches heavily clothed with long black hairs tipped with whitish, giving a grizzled dark gray effect above and on the sides, lighter below; apically the hairs become thinner, the annulations gradually becoming visible at about the end of the basal fourth; the rest of the tail is thinly clothed with long brownish black hairs, which form a well-developed tuft at the end, the scales, except at the extreme tip, visible through the hairy covering. The greater part of the head and the basal portion of the tail are gray, in strong contrast with the dark yellowish brown color of the upper surface of the body. Mammæ 4, abdominal; at least, no others can be discovered in the present specimen.

Measurements.—Total length, 560 mm; head and body, 240; tail vertebrae, 320; hind foot, 51 (without claws, 44); ear from notch (in dry skin), 14.

Skull.—Unfortunately the basal portion is broken, so that full measurements cannot be taken. Total length, —; basal length, —; zygomatic width,

32; mastoid width, —; interorbital width, 17; length of nasals, 17; width of nasals in front, 6.5; distance from nasals to fronto-parietal suture, 19.5; diastema, 12.5; palatal length, 17; upper tooththrow, 16; lower tooththrow, 16.5; lower jaw from tip of incisors to posterior border of condylar portion, 41.3; height at condyle, 15.

Dactylomys peruanus is based on a single female, with the teeth well worn, showing it to be fully adult. In respect to its capture the collector states (MS. notes): "I was looking after my traps just after daylight when I noticed this specimen running along the water's edge of the creek. I had no trouble killing it with a stick. Its stomach was filled with the inside of a palmetto nut, or some white tender root."

The only previously recognized species of the genus *Dactylomys* is *D. dactylinus* (Desmarest, 1817; ex E. Geoffroy MS.), based on a specimen in the Paris Museum, received from the Museum at Lisbon, and supposed to have been brought from Brazil.¹ A second specimen, a male, was collected by Natterer, on the Rio Negro; two specimens, a male and a female, were obtained on Castelnau's Voyage near Sarayacu, on the pampas of northeastern Peru (cf. Deville, Rev. et Mag. de Zool., 1852, 357); Dr. Günther records (P. Z. S., 1876, 743) the reception at the British Museum of "two fine skins of this rare Rodent, unfortunately without skulls, from the Rio Napo," concerning which he gives no further particulars; and Dr. Jentink mentions (Notes from the Leyden Museum, IX, 1887, 224) the acquisition by the Leyden Museum of an adult male, skin and skull, from the neighborhood of Nauta, opposite the mouth of the Ucayali River, "in northeastern Peru or Ecuador." Dr. Jentink gives external measurements and measurements of the skull of his specimen, but says nothing about its coloration. Neither can I find that the Natterer specimen has been described, beyond a transcript of Natterer's field notes by Dr. Pelzeln (Brasilische Säugethiere, 1883, 65), giving a few measurements and the color of the naked parts in life.

The original type specimen of the species has been repeatedly described, by various authors, and its skull and dentition figured (cf. Desmarest, I. Geoffroy, Waterhouse, etc.). Judging from these descriptions *D. peruanus* is very much smaller than *D.*

¹ "Patrie: l'Amérique méridionale; probablement Brazil."—I. Geoffroy, Mag. de Zool., 1840, Mamm., p. 48.

dactylinus, and very different in coloration. I. Geoffroy gives (Mag. de Zool., 1840, Mamm., 29) the length of the head and body of the Paris specimen as 350 mm. and the tail as 420; Dr. Pelzeln states that Natterer's specimen measured, total length 2' 3", length of tail, 15 $\frac{1}{4}$ "; Dr. Jentink's measurements of the Leyden specimen are, head and body, 328 mm., tail, 406 mm. The corresponding measurements of the type of *D. peruanus* are, 240 mm. and 320 mm. This example is an old female, while the Natterer and Leyden specimens are males, but the difference is apparently far too great to be merely sexual.

6. *Proechimys simonsi* Thomas.—This recently described species is represented by a single specimen, an adult female, which agrees perfectly with Mr. Thomas's description.

"I obtained this specimen on a tract of level land on top of the mountain range north of us. The land had been at one time covered with timber, and was an ideal place for mammals, but they proved to be very scarce, as this and No. 34 [*Didelphis pernigra*] were all I took during fourteen days with sixteen traps. Its stomach was empty."—H. H. K.

7. *Nectomys garleppii* Thomas.—Four specimens (3 males and 1 female, all adult), collected Nov. 1, 1899, and Jan. 3 and 7, and Feb. 20, 1900.

The collector's measurements from the fresh specimens are as follows:

16058, ♂,	Head and body,	214;	tail,	216;	hind foot,	51.
16057, ♂,	" "	241;	" "	242;	" "	51.
15801, ♂,	" "	240;	" "	230;	" "	54.
16059, ♀,	" "	253;	" "	242;	" "	57.

The female is wholly destitute of molar teeth in both jaws, and nearly all traces of their insertion have been obliterated by the filling of the former root-cavities by bony deposit.

"Taken in a pile of slide rock, caused by a landslide. It feeds on a green berry that is common here."—H. H. K.

8. *Neacomys spinosus* (Thomas).—Four specimens—2 adult males, 1 adult female, and 1 'young adult' male—Juliaca, Nov. 8–13, 1899. In the adults the pelage of the ventral surface is uniform whitish or yellowish white to the base, the tips of the hairs suffused with buff, especially over the pectoral region. In

the young specimen the pelage of the ventral surface is plumbeous for the basal two thirds of its length. (Cf. Thomas, under *N. spinosus tenuipes*, in Ann. and Mag. Nat. Hist., 7th Ser., V, Jan. 1900, 153.)

These specimens agree so exactly with Mr. Thomas's original description (P. Z. S., 1882, 105) of this species, from Huambo examples, that their specific identity seems obvious, except that the fifth hind toe, exclusive of the claw, reaches to the end of the first phalanx of the fourth toe, instead of "barely to the middle of the first phalanx of the fourth toe." The only mammæ discoverable in the female are 4, two pectoral and two abdominal.

"All taken at the same place, under the edge of a bluff on a small gulch. When the skin is fresh the spines on the back come out very easily. I call this mouse Porcupine Mouse."—H. H. K.

9. *Oxymycterus juliacæ*, sp. nov.

Type, No. 15804, ♂ ad., Juliaca, Peru, Nov. 29, 1899; coll. H. H. Keays.

Above dark chestnut brown, grizzled with black, darkest along the median line, where over a portion of the middle of the back the prevailing color is black; sides lighter and more reddish; below dull brownish gray, with a faint tinge of buff, well defined from the reddish brown color of the sides; chin dull yellowish white; ears pale brown, well clothed on the inner surface with dusky hairs, nearly naked externally; upper surface of fore and hind feet blackish brown, the palms flesh color, the soles darker, more brownish; tail unicolor, dark brown, sparsely clothed with short bristly black hairs, scarcely at all concealing the annulations.

Measurements.—Total length, 250 mm.; head and body, 138; tail, 112; hind foot, 32, without claws, 29; ear (in dry skin), 13, from notch, 16.

Skull.—Nasals broadest in front, slightly trumpet-shaped or flaring upward at the end, and terminating posteriorly in a line with the lachrymals. The rostral portion of the skull is broad in proportion to the rest of the skull, which is rather narrow and elongate. Anterior zygoma-root low, narrow, and much rounded off on the antero-superior border. Interorbital region with rounded borders, and an incipient muscular ridge running from the orbit posteriorly. Interparietal very small. Palatal foramina rather large, terminating posteriorly in a line with the end of the first third of m¹.

Total length, 36.4; basilar length, 29; zygomatic breadth, 16; least interorbital breadth, 6.7; mastoid breadth, 14.8; nasals, 15; interparietal, 2 x 5.5; diastema, 8; palatal foramina, 7.8 x 3; upper molar series, 8.

The type and only specimen is an adult male in fine condition, with the teeth much worn, showing it to be an old adult, yet there is barely a suggestion of parietal ridges, and no trace whatever of any postorbital processes.

Oxymycterus juliacæ is evidently closely related to *O. inca* Thomas, agreeing very closely with it in size and proportions, but differs from it so much in the color of the underparts, and in certain cranial details, that the two forms seem unquestionably separable.

10. *Oxymycterus apicalis*, sp. nov.

Type, No. 16064, ♂ ad., Juliaca, Peru, altitude 6000 feet, Jan. 7, 1900; coll. H. H. Keays.

General color above dull blackish washed with gray, darker on the median area, lighter, more grayish on the sides, the hairs being there minutely tipped with gray; below gray brown, with a slight buffy tinge, most pronounced on the chest and throat; the hairs being pale plumbeous basally and broadly tipped with grayish white; lips and chin faintly rufescent; ears pale brown, very thinly haired; fore feet dusky brown, palms pale brownish flesh color; hind feet rather lighter above than the fore feet and more grayish brown, the soles dark brownish, much darker than the palms; tail uniform brown above and below, except that the apical fourth to third is white, in strong contrast with the basal portion, the whole so thinly haired that the annulations are distinctly visible.

Measurements.—Type, total length, 158 mm.; head and body, 148; tail, 158; hind foot, 36, without claws, 33.5; ear (in dry skin), from crown, 16, from notch, 21. Another specimen, ♂ ad., is somewhat larger, measuring total length, 350; head and body, 165; tail, 185; hind foot, 37. A very old female measures exactly the same as the type.

Skull.—The skull is of the usual *Oxymycterus* type, the interorbital region being smoothly rounded, the parietal ridges obsolete, the anterior zygoma root narrow and strongly rounded on the antero-superior border, and the palatine foramina very large. The nasals are very long, extending back considerably beyond the posterior border of the anterior zygomatic arch. The skull of the type measures as follows: total length, 38; basal length, 30; length of nasals, 17; diastema, 9; zygomatic breadth, 17.5; interorbital breadth, 8; mastoid breadth, 14.8; palatal foramina, 8.6 x 3.5; upper molar series, 6.

Oxymycterus apicalis is based on four specimens, two adult males, one adult female, and a 'young adult' female, all collected at Juliaca, Peru, Dec. 20, 1899, and Jan. 4-7, 1900, by Mr. H. H. Keays. He says "it seems to be the most common small mammal here."

This species is easily distinguished from any of its described congeners by its large size, blackish coloration, and very long, white-tipped tail. The white tail-tip is present in all the specimens, but varies in length from about one sixth to one third of the total tail length.

11. *Oryzomys keaysi*, sp. nov.

Type, No. 16062, ♀ ad., Juliaca, Peru, altitude 6000 feet, Jan. 7, 1900; coll. H. H. Keays, in whose honor the species is named.

Above yellowish brown, varied with black-tipped hairs, especially on the middle area of the back, lighter and more yellowish on the sides, and slightly grayish on the front of the head and nose, darker, almost blackish, around the eyes and at the base of the tail; below grayish white, in some individuals with a slight yellowish tinge on the breast; ears very large, dark brown, thinly clothed with short blackish hairs; feet dull grayish brown, the toes of the fore feet and the hind feet nearly naked; palms dull light brown, soles blackish brown; tail very long, naked, rather dark brown above, a little lighter brown below.

Measurements.—Total length (type), 355 mm.; head and body, 158; tail, 197; hind foot, 38, without claws, 35.8; ear (in dry skin), from crown, 18, from notch, 21, by 20 in width. Another specimen, an adult male, measures the same; three other 'adults' range as follows; total length, 305–335; head and body, 150–162; tail, 155–174; hind foot, 32–34.

Skull.—The skull is very heavily built in all its parts, with the supraorbital bead and parietal ridges strongly developed; and the interorbital plane is decidedly depressed in old specimens. Palatal foramina short and broad.

Total length (of type), 38.3; basal length, 29.5; nasals, 15; zygomatic breadth, 19; mastoid breadth, 14.3; interorbital breadth, 6; diastema, 9.3; palatal foramina, 6.5 x 3; upper molar series, 6. Several other rather younger skulls range in total length from 35–37.

This species is based on a series of five specimens, all taken at Juliaca, respectively, Nov. 6, Dec. 1, Jan. 2, 4, and 6, and are very uniform in coloration. The November specimen is in shorter and more worn pelage than the others, and for this reason is perhaps a shade darker. Mr. Keays refers to this as the "most common mammal of the region."

Oryzomys keaysi is of about the size of *O. prator* Thomas, but appears to have a relatively longer tail, and differs from that species radically in coloration. It appears to have no very near known ally.

12. *Oryzomys obtusirostris*, sp. nov.

Type, No. 15811, ♀ ad., Juliaca, Peru, altitude 6000 ft., Dec. 6, 1899; coll. H. H. Keays.

General color above blackish brown with a faint yellowish wash, giving a slight general olivaceous effect, most pronounced on the sides, due to a slight fulvous tipping of most of the hairs; below dull buffy plumbeous, the buffy tinge strongest on the breast; ears black, well clothed with black hairs; hind

November, 1900]

feet dusky brown above, blackish below; fore feet much lighter, both above and below; tail dark brown, slightly lighter below, especially proximally, practically naked, with very fine scutellation. A second specimen, a young adult female, is similar except that it is slightly more fulvous on the sides and less dark on the ventral surface.

Measurements.—Type, total length, 227 mm.; head and body, 100; tail, 127; hind foot, 27, without claws, 25. Another specimen, somewhat younger (the last molar not fully grown), measures, total length, 211; head and body, 98; tail, 113; hind foot, 27.

Skull.—The skull is rather short and broad, the rostral portion especially short, with short but broad palatal foramina. Supraorbital bead and parietal ridges well defined. The dentition is very heavy for the size of the animal. The type is a full-grown specimen, but the teeth are wholly unworn.

Total length, 30; basal length, 21.5; nasals, 10; zygomatic breadth, 16; mastoid breadth, 13; interorbital breadth, 5.3; diastema, 6; palatal foramina, 4.7×2.5 ; upper molar series, 6.

This species is represented by two females, one a young adult, the other not quite fully grown. It agrees nearest in size and proportions with *O. longicaudatus* (Bennett), from which it differs in coloration and in cranial characters.

13. *Akodon caliginosus* (Tomes).—Four specimens, taken Nov. 28 and 29, 1899, and Jan. 6 and Feb. 22, 1900, are referred provisionally to this species.

"I believe these little fellows migrate, as I had six traps sprung by them in one night along their apparent line of travel."—H. H. K.

14. *Sciurus æstuans cuscinus* Thomas.—Two specimens, taken Dec. 2 and 7, 1899.

Mr. Keays says that according to the miners these squirrels are quite generally distributed wherever there is timber, but are not numerous. The miners had never seen any before at so high an elevation.

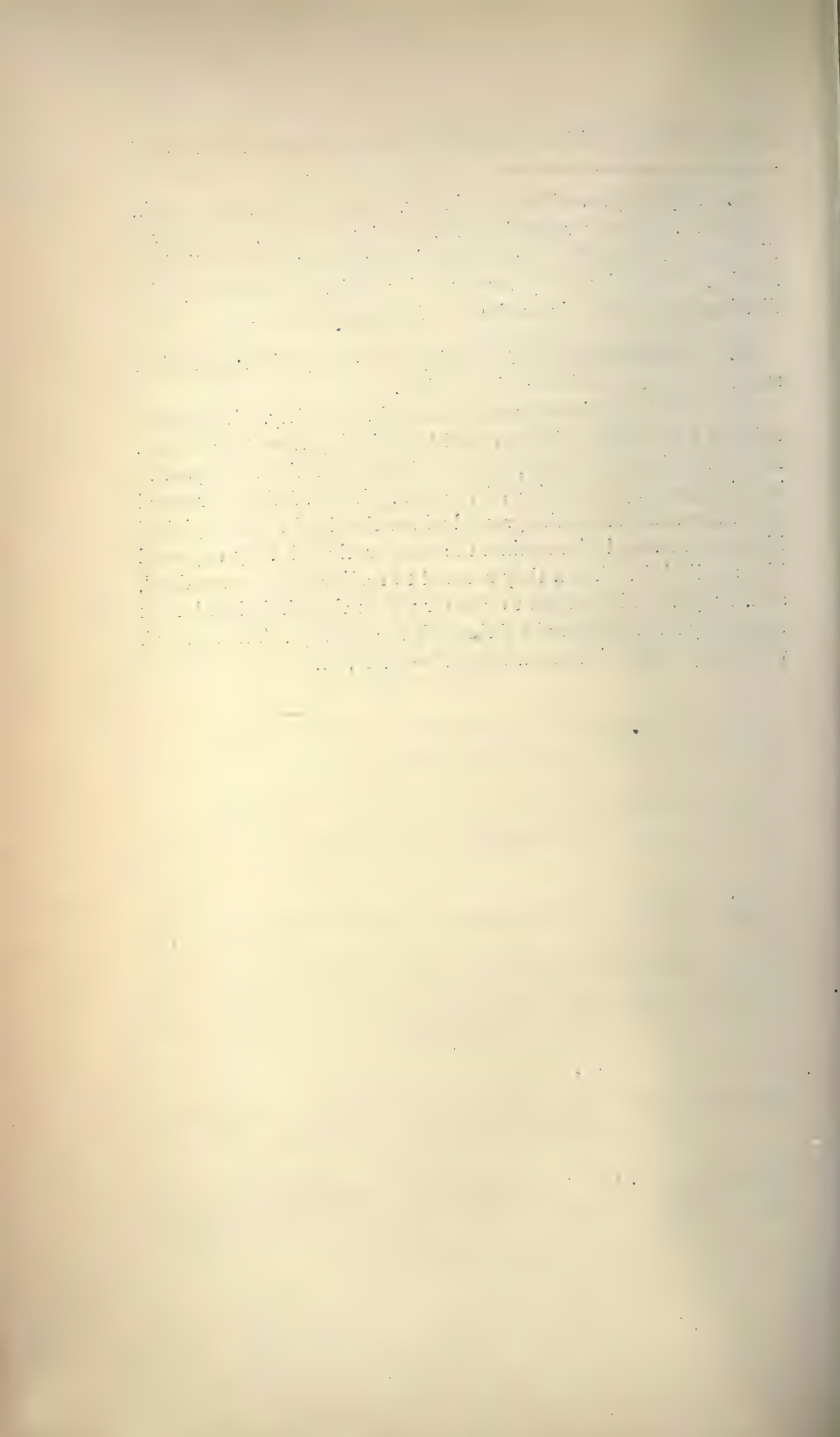
15. *Nasua nasua* (Linn.).—A young male, about one fourth grown, is provisionally recorded under this name.

16. *Nyctinomus*, sp.—Two specimens, ♂ and ♀ ad., March 14, 1900, representing a species nearly related to *N. brasiliensis* l. Geoffroy.

17. *Myotis*, sp.—Two specimens, ♂ ad., Dec. 2, and ♀ ad., March 10. Nearly related to *M. oxyotus* (Peters), but clearly different. Apparently the two specimens represent two distinct species, distinguished by strong color differences, and by the distribution of the hair on the interfemoral membrane.

18. *Alouata nigra* (*E. Geoffroy*).—One specimen, an adult male, taken at an altitude of 5000 feet.

"I took this specimen from a band of about fifty. They were the first I had seen. They travel by swinging from tree to tree. As the specimen fell dead, the rest of the band did not appear to be frightened by the noise of the gun. Two of them dropped down from the tree to the ground where the dead one lay, picked him up and stood him against the tree, as though they expected him to climb it. Then they seemed to realize that he was dead, and, dropping him, began to chatter; then the whole band took up the cry and scampered off through the treetops. The stomach was partly filled with green leaves."—H. H. K.



PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology.

Each Part of the 'Memoirs,' forms a separate and complete monograph, with numerous plates.

MEMOIRS.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xii-a-xx. April 22, 1898. Price, \$4.20.

PART IV.—A complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology (not yet completed).

The Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingstone Farrand. Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

BULLETIN.

Volume I, 1881-86.....	Price, \$5.50	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	4.75	" IX, 1897.....	4.75
" III, 1890-91.....	4.00	" X, 1898.....	4.75
" IV, 1892.....	4.00	" XI, Part I, 1898.....	1.25
" V, 1893.....	4.00	" " II, 1899.....	2.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00		

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

*Descriptions of Two New Species of
South American Muridæ.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,
VOL. XIV, ARTICLE II, pp. 39, 40.
New York, January 31, 1901.

The Knickerbocker Press, New York

Article II.—DESCRIPTIONS OF TWO NEW SPECIES OF SOUTH AMERICAN MURIDÆ.

By J. A. ALLEN.

For the material on which are based the descriptions of the two species of South American Muridæ here described I am indebted to the kindness of Mr. Oldfield Thomas, Curator of Mammals in the British Museum, who in referring the specimens to me for determination kindly gave me permission to publish any species that proved to be new. He has also permitted me to retain some of the duplicates for this Museum, the types being very properly returned to the British Museum.

Zygodontomys thomasi,¹ sp. nov.

Type, ♀ ad., Campo Alegre, Venezuela, 90 miles south of Cumana (alt. 1625 feet), May 4, 1899. Collector's No. 416. Type in British Museum.

Color above pale yellowish brown, clearest or most pronounced on the lower back and rump, and slightly darkened with black-tipped hairs, especially over the middle of the dorsal region; paler and grayer on the sides; sides of muzzle pale yellowish; below whitish gray, the hairs being plumbeous broadly tipped with soiled white; ears rather large, pale brown, clothed with fine short hairs; upper surface of both fore and hind feet pale buffy white, soles light brown, palms flesh-color; tail short, dark brown above, much lighter, grayish brown beneath.

*Measurements*².—Type, head and body, 125 mm.; tail, 99; hind foot, 23; ear, 18. Another specimen, ♂ ad., from Quebara Secca: Head and body, 116; tail, 101; hind foot, 26; ear, 17. Another ♂, young adult, from Campo Alegre: Head and body, 113; tail, 100; hind foot, 25; ear, 17.

Skull (type), occipital portion lacking, gives the following: Nasals to posterior border of parietals, 27; nasals, 12; palatal length, 13.3; zygomatic breadth, 16; interorbital breadth, 5; palatine foramina, 6.2 x 2.2; upper molar series, 4.

This species is based on three specimens, collected at Campo Alegre, Cumana, Venezuela, at altitudes varying from 1350 to 1625 feet, Feb. 2 and 7, and May 4, 1899, sent to me for examination by Mr. Oldfield Thomas, and on an additional specimen (Am. Mus. No. 14731, ♂ ad.), from a neighboring locality. In general form and proportions it resembles *Z. brevicauda* (All. &

¹ Named for Mr. Oldfield Thomas, to whom I am indebted for valued assistance.

² Collector's measurements, from the fresh specimen.

Chapm.) from the Island of Trinidad, but it differs from it in being fully one third smaller and very much paler in coloration.

***Sigmodon simonsi*, sp. nov.**

Type, ♂ ad., Eten, coast region of northwestern Peru (alt.) 10 to 15 m., Sept. 6, 1899; coll. P. O. Simons. Collector's No. 552. Type in British Museum.

Above pale buffy gray varied with black-tipped hairs; sides of head below eyes, and a well defined eyering, clear buff; nose and sides of muzzle pale ochraceous buff; whole underparts pale buff; ears finely haired, colored externally like the surrounding pelage, buff internally; upper surface of fore and hind feet pale buff, the hind feet a little darker than the fore feet; tail well covered with short stiff hairs, dusky brown above, lighter and more buffy brown below.

Measurements.¹—Type, head and body, 155 mm.; tail, 100; hind foot, 29; ear, 23. Five adult specimens (4 males, 1 female) measure: Head and body, 151 (134–164); tail, 98 (93–100); hind foot, 30 (29–31); ear, 21 (20–23).

Skull.—Posterior border of palate thickened and depressed; rostral portion of skull convex, the nasals markedly decurved anteriorly; skull in general broad and heavily ossified. Dentition very heavy. Total length, 35.7; basal length, 23.5; palate, 16; nasals, 12.4; zygomatic breadth, 20.3; mastoid breadth, 14.7; interorbital breadth, 6; palatine foramina, 7 × 2; upper molar series, 7.

This species is based on a series of five specimens collected at Eten, coast region of northwestern Peru, in September and October, 1899, by Mr. P. O. Simons, after whom the species is named. They are all practically adult, and all males except one.

Sigmodon simonsi is very distinct from any previously described species of the genus from South America. In the pale coloration of the dorsal surface it most nearly resembles *S. hispidus texianus*, and in the buffy ventral surface recalls *S. minimus* Mearns from Arizona, and *S. fulviventer* Allen from western Mexico. Its nearest geographical representative is *S. peruanus* Allen, from which it differs in the much broader and heavier skull of the latter, and also very strongly in coloration. *S. simonsi* is obviously a pale, desert type, while *S. peruanus* is as deeply colored as *S. bogotensis* or *S. sanctæ-martæ*. *S. peruanus* is very unlike the two last-named species, however, in cranial characters. *S. bogotensis* and *S. sanctæ-martæ*, it may be added, prove to be very closely related *inter se*.

¹ By the collector, from fresh specimens.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.	Price, \$5.00	Volume VIII, 1896.	Price, \$4.00
" II, 1887-90.	4.75	" IX, 1897.	4.75
" III, 1890-91.	4.00	" X, 1898.	4.75
" IV, 1892.	4.00	" XI, Part I, 1898.	1.25
" V, 1893.	4.00	" " " II, 1899.	2.00
" VI, 1894.	4.00	" XII, 1899.	4.00
" VII, 1895.	4.00	" XIII, 1900.	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London ;

J. B. BAILLIÈRE ET FILS, Paris ;

R. FRIEDLÄNDER & SOHN, Berlin ;

and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xii-a-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

(Continued on 3d page of cover.)

11

*On a Further Collection of Mammals
from Southeastern Peru, Collected
by Mr. H. H. Keays, with Descrip-
tions of New Species.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XIV, ARTICLE III, pp. 41-46.

New York, January 31, 1901.

The Knickerbocker Press, New York

Article III.—ON A FURTHER COLLECTION OF MAMMALS FROM SOUTHEASTERN PERU, COLLECTED BY MR. H. H. KEAYS, WITH DESCRIPTIONS OF NEW SPECIES.¹

By J. A. ALLEN.

The Museum has just received a third collection of mammals made by Mr. H. H. Keays, at the Inca Mines, near Juliaca, southeastern Peru. This collection contains nearly all of the species previously received from Mr. Keays, and eight additional, three of which appear to be undescribed. The species additional to the former list are nearly all from other localities, as San Antonio, Osila, and Tirapata, situated at much higher altitudes than the Inca Mines.

In this connection it is necessary to correct a misleading statement in my former paper in respect to the locality where the principal part of Mr. Keays's first collections were made. Mr. Keays's post-office address was Juliaca, and through lack of explicit information, it was inferred that the Inca Mines, where he collected, were in the immediate vicinity of Juliaca. In a later letter Mr. Keays informs me that the Inca Mines are situated about 200 miles northeast of Juliaca, on the east side of the Andes, on the Inambari River, a tributary of the Amazon, and at a much lower altitude than Juliaca. The altitude and geographical position were correctly given in the former paper, but in place of Juliaca, in the introduction and for the type localities, read Inca Mines. San Antonio and Tirapata have an altitude of 12,000 to 16,000 feet.

The species not recorded in the former list are indicated by a star prefixed to the number. All the external measurements given are the collector's measurements from the fresh specimens, except when otherwise stated.

1. *Didelphis pernigra* Allen.—A series of 5 adults—3 males and 2 females—collected at the Inca Mines, June 5–July 22, 1900, are exceedingly uniform in coloration, and agree perfectly

¹ For a report on the former collections see this Bulletin, Vol. XIII, 1900, pp. 219–227, published Nov. 16, 1900.

with the type and other specimens already described (this Bulletin, XIII, pp. 191 and 219). The small size of this species, for a member of the genus *Didelphis*, its intensely black pelage, wholly white ears, and prominent black eye-stripe serve at once to distinguish *D. pernigra* from any of its congeners.

2. **Thylamys keaysi** Allen.—Two specimens, ♂ and ♀ adult, Inca Mines, May 31 and July 2.

3. **Lagidium peruanum** Meyen.—One specimen, ♀ adult, Tirapata, Oct. 18, 1900. Mammæ 2, pectoral. Since sending his former field notes on this species (*l. c.*, p. 220), Mr. Keays has found it to inhabit "a part of the east slope of the Andes, where he found them quite common from 12,000 feet to 16,000 feet altitude." The female here recorded, he says, "contained one young; her teats, two in number, were large and situated on the upper breast."

4. **Dactylomys peruanus** Allen.—One specimen, male, Inca Mines, June 3, 1900. Although apparently fully adult, the last molar being fully grown and already somewhat worn, it is smaller than the female type (*l. c.*, p. 220).

This specimen is throughout a little brighter and richer colored than the type, and is doubtless in fresher pelage. The collector's measurements are as follows: Total length, 483 mm. as against 560 in the female; head and body, 228 (♀, 240); tail, 255 (♀, 320); hind foot, 44 (♀, 51). These measurements confirm the small size ascribed to this species in comparison with its congeners.

5. **Proechimys simonsi** Thomas.—The five additional specimens include 3 adult males, 1 adult female, and 1 half-grown female, all from Inca Mines. The young example is white below, like the adults, but uniform blackish above, with coarse sub-spiny hairs over the middle of the back. The adults are very uniform in coloration, with the median dorsal area distinctly blackish.

6. **Nectomys garleppii** Thomas.—Represented by a single half-grown female, dusky brown above with an olivaceous tinge, passing to yellowish olivaceous on the sides. Below buffy, as in the adults, but the buff is of a more olivaceous shade.

7. **Neacomys spinosus** (Thomas).—This interesting species is represented by 18 additional specimens, all adult, and all from Inca Mines. They vary greatly in color, in some specimens black

being the prevailing tint above, while others are uniform yellowish rufous above, with every intermediate stage.

8. *Oxymycter juliacæ* Allen.—A second specimen, an adult male, closely resembles the type (*l. c.*, p. 223) from which only the species was previously known. Both were collected at Inca Mines.

9. *Oxymycter apicalis* Allen.—An additional series of 9 specimens, all adult except one, which is only about one third grown. This is grayer below and less gray above than adults. In other respects the specimens are like those previously recorded. The white tip to the tail is a prominent feature in all.

10. *Oryzomys keaysi* Allen.—Five specimens, all adult, and like those previously described (*l. c.*, p. 225), and from the same locality.

11. *Oryzomys obtusirostris* Allen.—One specimen, adult male, Inca Mines, June 16. The faint yellowish wash on the upper parts is rather more pronounced than in the type, and the general coloration above is consequently less blackish than is indicated in the description of the species (*l. c.*, p. 225).

* 12. *Oryzomys stolzmanni* Thomas.—One specimen, an adult female, Inca Mines, May 5, 1900.

* 13. *Rhipidomys ochrogaster*, sp. nov.

Type, No. 16481, ♀ ad., Inca Mines, Peru (alt. 6000 feet), Sept. 14, 1900; coll. H. H. Keays.

Above dull yellowish brown, minutely varied with black-tipped hairs, paler and more yellowish on the sides; a slight dusky eyering; beneath pale ochraceous buff, the hairs at the extreme base pale gray; ears blackish brown, well haired externally, nearly naked within; upper surface of feet, including toes, dusky grayish brown, with longer whitish hairs at the base of the claws; tail uniform blackish, the proximal half scantily haired, the hairiness increasing apically, in some specimens wholly concealing the annulations, with a long bushy pencil at the end, the hairs extending as a heavy tuft 20 mm. beyond the vertebræ. Mammæ, 6,—4 inguinal, 2 pectoral.

Measurements.—Type, total length, 382 mm.; head and body, 154; tail to end of vertebræ, 228; hind foot, 35; ear (in dry skin) from notch, 19. Another specimen, also a female, measures, total length, 405; head and body, 164; tail, 241; hind foot, 38.

Skull (of type), total length, 37; basal length, 31; palatal length, 15; nasals, 14; zygomatic breadth, 19.5; interorbital breadth, 6; mastoid breadth, 10; palatal foramina, 8 x 3; upper tooth-row, 6.

This species is based on two females, both adult, but one a

little older and a little larger than the other. The smaller has been taken as the type, owing to the poor condition of the skull of the other. The specimens were collected at Inca Mines, Sept. 14 and Oct. 9, 1900.

Rhipidomys ochrogaster is one of the largest species of the genus, exceeded in size apparently by only *R. couesi* (All. & Chapm.) from Trinidad. All of the other buff-bellied members of the group are very much smaller, and otherwise obviously different. It differs from *Hesperomys* (*Rhipidomys*) *leucodactylus* Tschudi, the only other described Peruvian species, in being more than one third larger, and in its ochraceous instead of whitish ("subtus albescens") underparts.

* 14. *Phyllotis boliviensis* (*Waterhouse*).—Ten specimens, all adult, five of which are from San Antonio, collected Oct. 16, and five from Tirapata. The species was not met with at Inca Mines.

This species appears to be in part diurnal, as long since observed by Bridges (Ann. and Mag. Nat. Hist., XVII, 1846, p. 483). Mr. Keays obtained most of his specimens by shooting them while they were feeding on the grass, early in the morning and late in the evening.

The collector's measurements of these 10 specimens may be summarized as follows: Total length, 185 (177–216); head and body, 104 (95–114); tail, 82 (76–102); hind foot, 24 (23–25).

* 15. *Phyllotis osilæ*, sp. nov.

Type, No. 16503, ♀ ad., Osila, Peru (alt. about 12,000 feet), Oct. 19, 1900; coll. H. H. Keays.

Above fulvous gray, slightly darkened with black-tipped hairs, especially along the middle of the back; cheeks and sides pale dull fulvous (about 'cream buff' of Ridgway), sharply separated from the white of the ventral surface; sides of nose grayish white; lower parts white, the hairs plumbeous for the basal two thirds; pectoral region and median line posteriorly (for a short distance), and also a small area at base of tail, faintly tinged with buff; ears large, blackish-brown on both surfaces, nearly naked externally, clothed within with short fine dusky hairs; upper surface of hands yellowish white, of feet clear white; tail very long, slightly penicillate, dusky on the median line above, sides and below white, the lower surface thickly covered with soft silky white hairs, the upper surface sparingly clothed with dusky hairs, through which the annulations are plainly visible.

Measurements.—Type, total length, 232 mm.; head and body, 99; tail, 133;

hind foot, 25 ; ear (in dry skin), 24.5. A second specimen, 'young adult' female, is somewhat smaller, as follows : Total length, 191 ; head and body, 70, tail, 121.

Skull.—Similar in general features to that of *P. boliviensis*, but the interorbital and rostral portion slenderer and relatively longer, and the bullæ relatively smaller ; whole skull much smaller and more lightly constructed. Total length, 28 ; basal length, 22 ; palate, 12 ; nasals, 11.5 ; zygomatic breadth, 15 ; interorbital breadth, 4 ; mastoid breadth, 12.5 ; palatal foramina, 6 x 2 ; upper tooth-row, 5.7.

This species is based on two specimens, an adult female and a young adult female, the latter taken at Tirapata, Oct. 20, and the former at Osila, between San Antonio and Tirapata, Oct. 20. The collector states in his notes that they were taken at the same localities with *P. boliviensis*, and that they had the same habits. One was taken in a trap and the other shot while feeding late in the afternoon.

In size and proportions *P. osilæ* resembles the *P. amicus* group, especially *P. amicus montanus* Thomas, from Urumarca, northern Peru, from which it differs in being larger, with a longer tail, darker coloration, and dusky brown ears.

16. **Akodon caliginosus** (*Tomes*).—Represented by 19 specimens, 15 of which are adult and 4 young. All are from Inca Mines. The young examples include one about one half grown, one about one third grown, and one nursling. In coloration they scarcely differ from the darker adults. The olivaceous tint above in the adults varies somewhat in different specimens, being darker or lighter according to the extent of the yellowish rufous tipping the hairs.

* 17. **Akodon pulcherrimus** *Thomas*.—Five specimens, of which one is from Tirapata, and two each from Limbana and Crucero.

The collector's measurements of these specimens are as follows : Total length, 167 (162–176) ; head and body, 92 (89–96) ; tail, 76.5 (68–82) ; hind foot, 24 (22–25).

Mr. Thomas's description fails to mention the very prominent deep rusty fulvous spot on each side of the nose, but it otherwise exactly fits the present examples, except that his type considerably exceeds in size any of the specimens in this series. These specimens are, however, from near the type locality and are not likely to prove different from those described by Mr. Thomas.

* 18. *Akodon lutesens*, sp. nov.

Type, No. 16507, ♀ ad., Tirapata, Peru (alt. about 15,000 feet), Oct. 21, 1900; coll. H. H. Keays.

Pelage very soft and full. Above fulvous gray brown, mixed very slightly with dusky-tipped hairs; sides dull pale fulvous gray, passing gradually into the pale buffy gray of the whole lower surface; no distinct eyering; sides of muzzle and cheeks like rest of the head; ears very small, well haired, nearly concealed by the surrounding pelage, of the same pale fulvous gray tone as the rest of the dorsal surface; upper surface of hands dull dusky gray with a faint tint of fulvous; upper surface of feet dull yellowish gray; tail considerably shorter than head and body, scantily haired, with a faint median dusky line above, pale yellowish gray on sides, lighter, soiled gray below.

Measurements.—Total length (type), 140 mm.; head and body, 76; tail, 64; tarsus, 19; ear (in dry skin) 8.5. A second specimen; a young adult, has the same coloration and proportions, but is smaller (head and body, 70; tail, 57).

Skull.—The skull of the type is unfortunately much broken, but that of the topotype, though smaller, is perfect. The skulls seem to offer no special cranial distinctions. Total length, type, 24; basal length, —; zygomatic breadth (approximate), 12; interorbital breadth, 4; mastoid breadth, 10.5; upper tooth-row, 4.

This small, soft-haired, dull-colored species is based on two specimens, an adult female and a young adult male, taken at Tirapata, Oct. 21. The collector states they were "shot at 8 A.M. while feeding on the bark of a small sage shrub."

Akodon lutescens appears to resemble in a general way several other species of the soft-haired, dull-colored section of the genus, but agrees with none of the described species in respect to details of size, coloration, and proportions. It agrees quite nearly in size with *A. pusillus* (Philippi) from Valparaiso, Chili, but differs from it in the color of its ears, feet, and underparts. It differs much more widely from any of the other described species.

19. *Sciurus æstuans cucinus* *Thomas*.—Three specimens, all adult females, from the vicinity of the Inca Mines.

* 20. *Myotis*, sp.—Two specimens, representing a third species of this genus from Inca Mines (*l. c.*, p. 227), none of which is as yet satisfactorily determined.

* 21. *Lasiurus varius* (*Poeppig*).—One specimen, adult male, Inca Mines, June 16, 1900. "Taken from a woodpecker hole in a dead stub."—H. H. K.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Poas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	4.75	" IX, 1897.....	4.75
" III, 1890-91.....	4.00	" X, 1898.....	4.75
" IV, 1892.....	4.00	" XI, Part I, 1898	1.25
" V, 1893.....	4.00	" " " II, 1899	2.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00	" XIII, 1900.....	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London ;

J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May, 1899. Price, \$2.00.

(Continued on 3d page of cover.)

75

*The Musk-Oxen of Arctic America
and Greenland.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XIV, ARTICLE VII, pp. 69-86.

New York, March 27, 1901.

The Knickerbocker Press, New York

Article VII. — THE MUSK-OXEN OF ARCTIC AMERICA AND GREENLAND.

By J. A. ALLEN.

PLATES XII-XVI, AND 7 TEXT FIGURES.

A fine series of Musk-Oxen, collected by Lieut. R. E. Peary, U. S. N., on Bache Peninsula, October 7, 1898, and recently received at the Museum through the Peary Arctic Club, has furnished opportunity for comparison of the coast form with the Musk-Oxen of the Barren Grounds east of the Mackenzie River, and with others alleged to have come from the barren grounds of Alaska, west of the Mackenzie.

Respecting these specimens, the following extract from a letter from Mr. Peary to the President of the Peary Arctic Club, dated "Etah, Greenland, Aug. 28, 1899," will be of interest :

" I send you skins and skulls of Musk-Oxen killed on Bache Peninsula in October, 1898, with skulls of eight others, killed in the same place. I regret that there are no measurements of these animals. I have been unfortunate in not being present at the killing of any of the animals. Fifteen, comprising all of one herd, were killed on the afternoon of Oct. 7, when the days were very short; and what with the cold and darkness and the necessity for skinning the animals with the utmost speed before they became frozen and before the meat was tainted, seven of the skins were spoiled as specimens, and the corresponding leg bones of the other eight were not noted by the Eskimos and were not possible of identification when I reached the place the next day.

"Also skin and skull of another (a bull) killed in the same locality April 14, and the skin and skull of a calf killed by Dr. Dedrick at Fort Conger and brought in by him intact so that I was able to get measurements."

This material proved on examination to consist of ten skins with skulls, one skin (of a yearling) without skull, one head of an old bull, and seven additional skulls without skins, representing in all nineteen individuals. The skins comprise two adult females and a female calf, three old males, and five young males of different ages. Five of the skins have been selected to mount for a group, with the proper accessories. The mounting of the animals is so nearly completed that it is practicable

to give photographs of them in the present connection, as well as photographs of mounted specimens from the Barren Grounds.

For comparison with the Peary material the Museum has three mounted specimens,—two adult males and an adult female,—an unmounted adult male, and two calves a few weeks old, from the Barren Grounds east of the Mackenzie, but without data as to exact locality. For opportunity to examine also three Alaska specimens,—two old males and an old female,—said to have been taken a few miles inland from Camden Bay, I am indebted to the kindness of Mr. Hubert H. Vogelsang, taxidermist, of New York City.

As regards both skins and skulls, it has thus been possible to compare the nineteen Peary specimens from Bache Peninsula with nine specimens from the Barren Grounds. This comparison has resulted in the rather surprising discovery that the Musk-Oxen of the insular lands west of Kane Basin differ very markedly from those of the Barren Grounds to the westward, not only in coloration but in shape and relative size of the basal portion of the horns. As *Ovibos moschatus* (Zimmermann) was based exclusively on the Barren Ground form (the type locality being the Churchill River region), it seemed fitting to name the new coast form in honor of the intrepid Arctic explorer, Lieut. R. E. Peary, U. S. N., to whose labors in the high North the Museum is indebted for a large amount of valuable material in various lines of research. Since adopting this name in my manuscript, however, Mr. R. Lydekker, of the British Museum, has named the East Greenland Musk-Ox *Ovibos moschatus wardi*, taking for his types a mounted male and female from East Greenland, in the possession of Mr. Rowland Ward, the well-known natural history dealer of Piccadilly, London, for whom the species is named. (See *Nature*, Vol. LXIII, p. 157, Dec. 13, 1900.)

Although the Peary specimens came from Bache Peninsula, on the western side of Kane Basin, they probably are referable to the Greenland form, and I hence adopt for them Mr. Lydekker's name, citing "*Ovibos pearyi* Allen, MS.," as a provisional synonym, which may be accepted for the Grinnell Land animal in case it should prove separable. On geographical and other grounds, this appears hardly probable, as the Musk-Ox of this

region seems to have a practically continuous distribution on the American side from the southern part of Ellesmere Land (about Lat. 78°) northward to the Polar Sea, and on the Greenland side, from Melville Bay (about Lat. 75°) northward, eastward, and southward along the east coast to King William Land in about latitude $74^{\circ} 30'$. It seems probable, as stated by Greely (Three Years of Arctic Service, Vol. II, 1886, p. 361), that the Musk-Ox may have reached Greenland from the west at two points, namely by crossing Smith Sound from Ellesmere Land, and also by crossing Robeson Channel from Grinnell Land, thence finding easy passage along the low Greenland coast to East Greenland.

As very few details have been published regarding the external characters of the East Greenland Musk-Ox,¹ and none in regard to the Ellesmere Land form, it seems desirable to utilize the present materials as a contribution to the subject.

Ovibos wardi (Lydekker).

PEARY'S MUSK-OX.

Ovibos moschatus wardi LYDEKKER, Nature, LXIII, p. 157, Dec. 13, 1900.

Ovibos pearyi ALLEN, MS.

General coloration, including horns, lighter than in *O. moschatus*, with a white or whitish face-spot, and the ears and whole front of the head more or less gray, instead of wholly dark brown as in *O. moschatus*; basal portion of the horns much narrower and of different shape from those of *O. moschatus*.

Adult Male.—Above with a 'saddle-mark' of light brown or whitish brown on the middle of the back, varying somewhat in degree of lightness, size, and shape in different individuals; rest of the body dark brown, lighter and more rufous brown on the shoulders; a white area on the front of the head, forming a broad face-spot; ears and a rather broad, not well-defined patch below the ears, spreading forward on the sides of the head, gray; the rest of the head, where not white, whitish, or grayish white, is more or less grizzled through the admixture of white hairs; whole nose white or whitish, the white of the nose separated from the white of the forehead by a darker band half way between forehead and nose; feet white or whitish from the hoofs upward to or a little beyond the carpal and tarsal joints, including nearly all of the portion of the limbs not concealed by the long shaggy coat of the body, becoming darker proximally so that the white of the feet rather gradually merges into the darker color of the upper segments of the limbs. The white on the head in old

¹ Its soft anatomy has been recently described by Dr. Einar Lönnberg ('On the Soft Anatomy of the Musk-Ox (*Ovibos moschatus*),' Proc. Zool. Soc. London, 1900, pp. 142-167, with 14 text figures), and the same author (*l. c.*, pp. 686-718, with 10 text cuts) has also given an account of the development of the horns, the character of the hoofs, and a detailed description of the skull, based on specimens obtained in East Greenland by the Swedish Expedition in 1899. Sir John Richardson's description of the osteology of the Musk-Ox, based on specimens from the Arctic Barren Grounds, in the 'Voyage of the Herald,' is well known.

males often forms a white band behind the horns ; in others it is partly in front of them and partly behind them, or entirely in front of them.

Females and Young Males.—The females and young males are similar, as regards the light markings. The white on the head is somewhat variable in respect to purity and extent in different individuals ; it is never wanting and averages about as above described.

Young.—A young female calf, probably not more than six weeks old, killed at Fort Conger May 18, 1899, is nearly black throughout, except for the grayish ears, whitish nose, dingy brown feet, and a lighter, brownish, incipient saddle-mark on the back, being much darker than the adult and half-grown specimens, and with only a trace of the white face-spot of the adults.

Measurements.—Unfortunately, as already explained, no measurements were taken from the animals before skinning. The following are from

MEASUREMENTS OF MOUNTED SPECIMENS OF
Ovibos moschatus AND *O. wardi*.

Museum Number.	<i>O. moschatus</i> .			<i>O. wardi</i> .	
	326	10034	11986	15594	15591
Sex.	♂ ad.	♂ ad.	♀ ad.	♂ ad.	♀ ad.
Total length, nose to rump, along curvatures.....	2500	2400	2200	2540	2000
Total length, nose to rump, in straight line.....	2230	1980	1970	2045	1660
Length of head.....	575	620	450	500	420
Height at shoulder.....	1200	1280	1100	1230	980
" " hips.....	1150	1090	1000	1160	940
Length of hind foot.....	445	500	375	450	355
" " fore foot.....	338	335	285	295	290
" " ear.....	85	110	134	156	115
Width of hind foot.....	90	160	105	95	78
Length of one hoof, vertical.....	85	80	68	47	46
Width of fore foot.....	107	127	125	105	90
Length of one hoof, vertical.....	98	75	73	58	54

mounted specimens, and probably do not vary much from the true dimensions.¹ For comparison, perfectly comparable measurements (in millimeters) are given of three mounted specimens of *O. moschatus* from the Barren Grounds east of the Mackenzie River.

Skull.—The skull does not appear to differ materially in size or proportions from that of *O. moschatus*. But there is a marked difference in the size and form of the basal portion of the horns, as shown in the accompanying illustrations (Figs. 1-5). The greatest width (taken with calipers) at the extreme base is one fourth less in *O. wardi* than in *O. moschatus*, and at 100 mm. from the base, one sixth narrower, resulting in very different outlines for

¹ Mr. Peary's measurements of the calf killed at Fort Conger, May 18, 1899, are as follows : "Length over all, 3 feet 5 inches (1019 mm.) ; height at foreshoulder, 2 feet (610 mm.) ; girth of chest, 2 feet 3 in. (584 mm.) ; girth of abdomen, 2 feet 1 in. (511 mm.) ; girth of neck, 1 foot 3 in. (330 mm.). Eyes, black. Weight, 43 pounds."

the basal portion of the horn in the two species. In length and curvature of the horns there is very little difference between the two forms. The apparent difference in the length of the horns of the two skulls photographed is due to the horns of the Bache Peninsula specimen being very much worn, as is commonly seen in the horns of old bull Bisons.

In these illustrations the relative greater breadth of the base of the horns is strikingly indicated in the side view, where, in *O. moschatus*, the anterior extension of the base of the horn conceals the greater part of the left eye-socket, while in the Bache Peninsula specimen it does not hide even its posterior border. It will also be noted that the occipital portion of the skull is exposed, in both views, in *O. wardi*, and concealed in *O. moschatus*, by the expanded posterior base of the horns.

Figures 1-4 are from photographs, all made to the same scale. The two skulls here shown are both old males, in prime of life, the teeth being not greatly worn; the two specimens are strictly comparable as to age, as shown by the teeth and sutures of the skulls.

MEASUREMENTS OF SKULLS OF MALES OF
Ovibos moschatus AND *O. wardi*.

	<i>O. moschatus.</i>			<i>O. wardi.</i>		
	A	B	16604	15594	15593	15596
	♂ ¹	♂ ¹	♂ ²	♂ ³	♂ ³	♂ ³
Total length.....	500	515	480	510	476	480
Basal length.....	437	455	445	465	440	445
Palatal length.....	265	275	260	280	260	260
Length of nasals.....	154	158	?	160	148	155
Mastoid breadth.....	168	182	182	184	174	175
Interorbital breadth (at outer posterior border of eye-sockets)...	265	—	250	263	220	225
Length of upper tooth-row.....	138	132	123	130	138	139
Width of palate opposite m'....	77	75	80	82	80	77
Lower jaw, length from incisive border to posterior edge of condyle.....	370	—	—	385	370	374
Lower jaw, height.....	180	—	—	175	170	170
Length of lower tooth-row....	145	—	—	130	140	141
Distance between tips of horns.....	620	675	583	495	630	540
Breadth of horn at base.....	235	230	250	165	167	213
“ “ “ 100mm. from base.....	148	126	127	116	117	108
Length of horn measured along curvature of upper surface....	650	565	575	490	560	530

¹ A, and B, Camden Bay, Alaska. Both specimens are fully adult, but specimen B is a little older and larger than specimen A, the teeth in the latter being practically unworn, while in B the teeth are moderately worn.

² No. 16604 is from the Barren Grounds east of the Mackenzie River,—an adult male with the teeth moderately worn. The skull lacks the lower jaw.

³ Nos. 15594, 15593, and 15596, from Bache Peninsula are all adult males, the teeth showing full maturity, being moderately worn in two of them; they are therefore strictly comparable with the specimens from the Barren Grounds.



Fig. 1. *Oribos wardi*, ♂ ad., No. 15594. Bache Peninsula.



Fig. 2. *Oribos moschatus*, ♂ ad., No. 16604. Arctic Barren Grounds.



Fig. 3. *Ovibos wardi*, ♂ ad. Same specimen as shown in Fig. 1.



Fig. 4. *Ovibos moschatus*, ♂ ad. Same specimen as shown in Fig. 2.

In coloration *O. moschatus* differs from *O. wardi* in the generally darker color of the whole animal, including the horns as well as the pelage, but especially in the color of the head, which, except the muzzle, is wholly dark brown, without the white face-spot or any appreciable admixture of gray on the front and sides of the head or on the ears. (Plates XII–XVII.) In a single old female, out of six old males and two old females examined, there



Fig. 5. *Ovibos wardi*, ♂ ad. Independence Bay, Greenland, 'Headpiece' from Peary's 'Northward over the Great Ice,' Vol. I, 1898, p. 329, through the kindness of the Frederick A. Stokes Company, publishers. The first illustration of the skull of *Ovibos wardi* ever published.

are a few gray hairs on the face, but they are not noticeable except on close inspection; on parting the hairs with the hand a sparse sprinkling of such hairs can be seen. The other seven show no white or gray on any part of the head or ears. The difference in the size and form of the basal portion of the horns is a further important differentiation of the two forms. (Figs. 1–5.) The

hoofs also differ greatly in the two forms, as shown in the accompanying diagrams (Figs. 6 and 7) and in the

table of measurements, the front of the hoof being much longer and more incurved in *O. moschatus* than in *O. wardi*. The geographical relations of the two are not clear, but it seems probable that *O. wardi* is the form inhabiting the numerous islands, more or less joined by ice in winter, situated east and north of Belcher Channel and Jones Sound, while *O. moschatus* is confined mainly to the Barren Grounds, with formerly, probably, continuous distribution westward across Alaska. The eastern limit of *O. moschatus* cannot at present be accurately defined. The Melville Island specimens obtained by Parry on his first voyage in 1820, evidently represent typically the Barren Ground form, as shown by Parry's and Gray's figures.¹ Whether or not

¹ See Parry's First Voyage, 1821, p. 257, and plate xvii, facing p. 256. Also Gray, Cat. Mamm. in Brit. Mus., Part III, 1852, p. 43, and pl. v., figs. 1 and 2, giving two views of skull of an old male, collected by Parry on Melville Island.

it crosses eastward to the adjoining islands there is apparently no certain evidence, but much of a negative character indicating its absence. It can easily reach Melville Island from Banks Land. It has been found in numbers in the region between Repulse Bay and King William Land, but is absent from Southampton Island, and Fox Channel has apparently proved a barrier to its extension to Cockburn and Baffin Lands. As *O. wardi* has not been traced south of Ellesmere Land, nor west of Ellesmere Land and

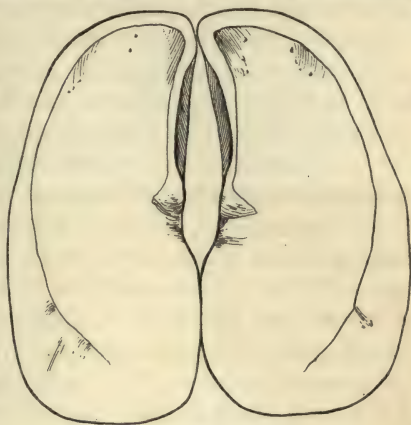


Fig. 6. Forefoot of *Ovibos wardi*,
 $\frac{1}{2}$ natural size.

Grinnell Land, there is apparently a broad interval of insular areas and estuaries where no form of Musk-Ox at present exists, leaving the ranges of the two forms well separated. When Musk-Oxen ranged far to the southward of their present limits, they doubtless had a continuous distribution over a large part of northern North America, and have become differentiated in comparatively recent times through separation in their gradual retreat northward.

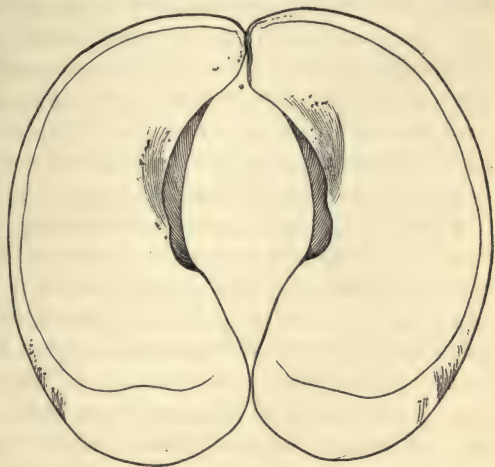


Fig. 7. Forefoot of *Ovibos moschatus*, $\frac{1}{2}$ natural size.

The known range of *O. wardi* extends from the southern border of Ellesmere Land northward through Grinnell Land to

the Polar Sea, and on the Greenland coast, either living or recently extinct, from about Lat. 78° on the western side northward to and around the northern end of Greenland to about latitude 75° N. on the east coast.

As early as 1853 Dr. Kane found recent remains of Musk-Oxen in the vicinity of Rensselaer Bay, west coast of Greenland, in latitude $78^{\circ} 41'$ N. (Arctic Expl., Vol. II, pp. 80 and 456), and later Dr. Hayes and subsequent explorers discovered similar remains near Foulke Fiord, somewhat further south (Lat. $78^{\circ} 18'$ N.). According to Kane, living animals were seen near Cape George Russell as late as the spring of 1850 (*l. c.*, p. 459), while Hayes reports (Voy. Towards the North Pole, 1886, p. 390) that two were seen and one killed by an Eskimo hunter near Wolstenholme Sound in the winter of 1859. In July, 1892, Peary killed Musk-Oxen in northernmost Greenland, at Independence Bay, and again at the same place in 1895, but beyond a 'headpiece', giving a very good front view of the skull (Northward over the Great Ice, I, 1898, p. 329), and reproductions of indistinct photographs, almost valueless as to details (*l. c.*, pp. 337 and 339), and some very good photographs of similar subjects taken in 1895 (*l. c.*, Vol. II, pp. 472, 475, 477), we have nothing tending to show their external features, either in text or figures. The figure of the skull in Vol. I (p. 329), here reproduced (Fig. 5), shows the form of the horns to be as in the Bache Peninsula specimens,¹ and the second series of pictures of dead Musk-Oxen (Vol. II, *l. c.*) illustrate admirably the white face-mark, which forms so distinctive a feature of the coloration. The picture of a wounded old bull (II, p. 472), gives a front view of the head, in which the white face-mark and the generally light color of the head are admirably shown. This is supplemented by a side view (*l. c.*, 473), and a view of a dead Musk-Ox lying on its right side, giving a clear view of the dorsal aspect of the whole animal, both of which show the same feature. There is also (*l. c.*, p. 486) a view in profile of a living Musk-calf.² While no specimens from northeast Greenland are available for examination, these

¹ Compare Schwatka's figures of the Barren Ground Musk-Oxen in his 'A Nimrod in the North' (1885), plate facing p. 105.

² Through the kindness of the Frederick A. Stokes Company of New York City, publishers of Mr. Peary's 'Northward over the "Great Ice,"' I am able to here reproduce four of Mr. Peary's illustrations (see Fig. 5 and Plates XVI and XVII).

illustrations render it certain that the Independence Bay Musk-Oxen closely resemble the Musk-Oxen of Bache Peninsula.

The Nares Expedition found numerous recent traces of Musk-Oxen on the northern shore of Ellesmere Land, just south of Bache Peninsula, in 1875, and living Musk-Oxen at various points along the eastern coast of Grinnell Land (Narr. Voy. to the Polar Sea, Vols. I and II, 1878, *passim*, and Vol. II, pp. 198-202—a summary by Lieut. Feilden); while Greely (Three Years of Arctic Service, Vols. I and II, 1886, *passim*, and Vol. II, pp. 360-363, summary) found them extensively distributed over Grinnell Land; yet little has been made known respecting the animals beyond some observations on their habits and localities of occurrence. In Nares' 'Narrative' (Vol. I, p. 113) is a cut, 'Head of Musk-Ox', which shows very well the narrowness of the base of the horns, but nothing apparently of the coloration. In Greely's 'Three Years of Arctic Service' (Vol. I, facing p. 104) is an engraving from a photograph of a 'Musk-Ox killed near Fort Conger', showing imperfectly the base of the horns, but no color effects; and there is a woodcut (*l. c.*, p. 363) of 'Musk-Calves at Conger, Four Months Old', from a photograph. If specimens were collected on any of these expeditions they have apparently remained undescribed.

The first intimation that either the Grinnell Land or the Greenland Musk-Oxen differed in any way from the Barren Ground stock appears to have been given by Mr. Lydekker in a recent article in 'Knowledge' (Vol. XXIII, No. 176, June, 1900, pp. 137-139), in which appears an illustration, from a photograph, of a young male captured in August, 1899, "in Clavering Island, situated off the coast of East Greenland, opposite König Wilhelm Land, in about latitude 74.5° N." In reference to this he says: "But there is one respect in which the Clavering Island calves¹ differ from the adult specimens exhibited in the British Museum, as well as from the descriptions generally given of the species. This is the presence of a large patch of white hair on the forehead, as well as of an ill-defined white streak down each side of the face, and some scattered white hairs in the middle line between the muzzle and the eyes. When this feature was first no-

¹ The calf when photographed must have been a 'yearling,' and hence not in first pelage, in which there is no indication of the future white face-spot. See *antea*, p. 72.

ticed, it was thought that the East Greenland Musk-Ox might prove to be a race distinct from the West Greenland and American form, in which the face is, at least in most cases, uniformly dark brown. I have, however, received from Dr. A. G. Nathorst an illustrated account in Swedish of Musk-Ox hunting in East Greenland in 1899; and the photographs in this, although they are unfortunately on a very small scale and by no means distinct, seem to show that while some of the bulls have brown faces, in others there is a considerable amount of white, yet the large frontal patch of white which forms such a conspicuous feature of the calves is, of course, obliterated by the expanded bases of the horns. Accordingly, there seem no grounds for separating the Musk-Ox of East Greenland from its representative in West Greenland and Arctic America, although the two would appear to be completely isolated" (*l. c.*, p. 138).

He appears, however, to have since changed his opinion regarding its relationship, and in a note of seven lines (*Nature*, *l. c.*) has proposed to call it *Ovibos moschatus wardi*. Under the title, 'A New Race of Musk-Ox,' he says: "Mr. Rowland Ward has on view at his establishment at Piccadilly a mounted adult male and female musk-ox from East Greenland, which differ from the ordinary form in having a large whitish patch on the face, as well as in certain other details of coloration. They may be made the types of a new race, under the name *Ovibos moschatus wardi*. The female was recently exhibited at the Zoölogical Society." Mr. Lydekker thus makes no reference to any difference in the shape of the basal portion of the horns in *O. wardi* as compared with those of *O. moschatus*, and we must turn to the article in 'Knowledge' (to which, however, Lydekker here makes no reference) to ascertain what are the differences in coloration, beyond the presence of a white face-patch. It seems, however, almost beyond question that Lydekker's name *wardi*, based on East Greenland specimens, is applicable to the Musk-Oxen of North Greenland, Grinnell Land, and Bache Peninsula.

We are thus indebted to Lieutenant Peary for the first indication of the peculiarities of the animal now recognized as *O. wardi*, as furnished by his half-tone reproductions of photographs of North Greenland Musk-Oxen, and also for the first specimens of this form, received, as above noted, at this Museum in November, 1899.

OCCURRENCE OF MUSK-OXEN IN ALASKA.

Richardson, in the 'Fauna Boreali-Americana' (Vol. I, 1829, p. 276), says: "From Indian information we learn that to the westward of the Rocky Mountains, which skirt the Mackenzie, there is an extensive tract of barren country, which is also inhabited by the musk-ox and reindeer. It is to the Russian traders that we must look for information on this head; . . ." In the 'Zoölogy of the Voyage of the Herald' (Fossil Mammals, 1854, pp. 22-28), he describes various fossil remains of the Musk-Ox from the ice-cliffs of Eschscholtz Bay, and repeats, in substance (*l. c.*, p. 28), the above-quoted statement from the 'Fauna Boreali-Americana.' He also considers that the Musk-Ox skull described by Buckland (Beechey's Voyage to the Pacific, App.), found "on the beach at the bottom of the mud-cliff in Eschscholtz Bay," and "so slightly decayed that it seems to have been derived from a carcass that has long since been stranded by the waves," and not figured, "as it cannot be considered fossil," really had fallen from the cliff, and was therefore to be considered as a part of the fossil fauna of the ice-cliff (Richardson, *l. c.*, p. 22).

Mr. John Murdoch states (Rep. Exped. to Point Barrow, 1885, p. 98) that just before leaving Point Barrow, a skull of a Musk-Ox "was brought in by one of the trading parties from the eastward. . . . In the hurry and excitement of the time, we neglected to find out more accurately the locality from which it came. The party had been as far east as the Colville, and the skull may have been brought from there. The natives knew the animal well, and called it by nearly the same name as the eastern Eskimos, but none had ever seen it alive. The skull obtained appeared very old and much weathered." Apropos of this skull, Dr. F. W. True says (Nelson's Report on Nat. Hist. Coll. made in Alaska, 1887, p. 233, footnote): "This may be subfossil. The skull procured by Mr. Murdoch is very much broken and worn."

According to Mr. Witmer Stone, in his recent 'Report on the Birds and Mammals collected by the McIlhenny Expedition to Pt. Barrow, Alaska' (Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 35), the McIlhenny collection made at Point Barrow contained "One weather-beaten [Musk-Ox] skull picked up on the tundra."

[*March, 1901.*]

Mr. L. M. Turner (Contr. to the Nat. Hist. of Alaska, 1886, p. 203), referring to the Musk-Ox, says : " There is no positive evidence of the actual occurrence of this mammal within the region here included [the Yukon District and the Aleutian Islands] ; but, as the northern Innuits and Indians are so well acquainted with it, there can be no doubt that it has but recently disappeared, *if scattered individuals do not yet inhabit the region northeast of the Rumianzof Mountains and near the Arctic coast.*" (Italics not in the original.)

In 1898, Mr. Frank Russell, in his ' Explorations in the Far North ' (1898, pp. 235, 236), makes the following statement : " The musk-ox was formerly common between the Mackenzie and Behring Straits, as evidenced by the remains which are scattered over the tundra. The oldest natives at Point Barrow say that their fathers killed musk-ox which were then abundant. Their present distribution is from the vicinity of the Mackenzie north of Great Bear Lake to Sabine Island ($74^{\circ} 47' N.$) on the east coast of Greenland, and from $60^{\circ} N.$ in the Barren Ground west of Hudson's Bay through the Northern Islands as far as man has penetrated."

The foregoing respecting the supposed existence, or recent existence, of the Musk-Ox at points near the Arctic coast of Alaska is of special interest, though mainly in the nature of hearsay evidence, in connection with the statements here following : About a year since I was informed by Mr. E. Bowsky, a furdresser of New York City, that he had received a fine large male Musk-Ox skin from Alaska. Although I was naturally skeptical as to the locality, I examined the specimen with great interest ; it seemed, however, not to differ appreciably from the Musk-Ox of the Barren Grounds east of the Mackenzie. It was an unusually fine winter skin, with the skull. A few months later the same gentleman kindly called my attention to two other supposed Alaskan Musk-Oxen, a pair, adult male and female, and submitted correspondence showing that they were purchased and shipped at Camden Bay, Alaska, by the agents of the well-known and reliable house of Herman Liebes & Co., of San Francisco, Cal., who had also obtained, from the same point, the first specimen of this series of three. They were supposed to have been killed and prepared by the natives, who presumably obtained them a few

miles inland from Camden Bay,— in other words, just where Mr. Turner believed “ scattered individuals ” might still exist in 1886, namely, between the Rumianzof Mountains and the Arctic coast, in northeastern Alaska.

As already said, these ‘ Alaskan ’ specimens do not appear to differ appreciably from examples of corresponding age and season from the Barren Grounds east of the Mackenzie. This is not perhaps surprising, since in comparatively recent times the species doubtless had a continuous distribution throughout the barren grounds of the Arctic coast, from Alaska eastward. Richardson, in 1854, gave its range as extending westward “ to the eastward outlet of the Mackenzie,” but had only vague Indian reports of its existence west of the Mackenzie.

As the remains of Musk-Oxen have been found at various points in the frozen soil of Siberia, in the ice-cliffs of Eschscholtz Bay, and, in Postpliocene times, even as far south in Europe as England and France, and in the United States as far south as Utah, Kentucky, and Mississippi, it is evident that the genus *Ovibos* is a declining type, which has reached its last stronghold in the Arctic Barren Grounds, the islands of the northeast coast of America, and a narrow coast belt in northern Greenland. Its recent history shows that it will soon be a creature of the past wherever it can be reached by man. Mr. Andrew J. Stone states (this Bulletin, Vol. XIII, 1900, p. 42): “ Their range is becoming more and more contracted all the time, as roving bands of Indians from the Hudson Bay posts, on Great Slave Lake and near Great Bear Lake, make occasional raids upon them, and almost always destroy the entire herd attacked.”

In Mr. Stone's notes on the Musk-Ox (*l. c.*) he stated that his inquiries among the Indians and Eskimo west of the Mackenzie River had led him to believe that this animal “ has not inhabited that region for a very long period.” Since the preceding part of this paper was put in type I have had opportunity again to discuss with him the question of the existence of Musk-Oxen in Alaska, and as a result he has kindly acceded to my request to put in writing a more detailed statement of his reasons for this opinion. This statement is herewith appended, since it seems to show that there is very little if any probability that the Musk-Ox

still exists in any part of Arctic America west of the Anderson River. While Mr. Stone does not question that the supposed Alaska Musk-Ox skins mentioned above were shipped to San Francisco from Camden Bay, he claims, apparently with good reason, that they must have been taken far to the eastward of this point and brought to Camden Bay by whalers. His statement, dated Feb. 28, 1901, is as follows :

MY DEAR DR. ALLEN :—

In response to your inquiry in reference to the existence of the Musk-Ox (*Ovibos moschatus*) west of the Mackenzie River, or in Alaska, I will state there are none of these animals in any part of Arctic America west of the Mackenzie. Previous to my departure for the North in the spring of 1897, I had for several years carefully searched for information upon this subject, and from what I had gathered I had a faint hope of finding some of these animals in the mountains west of the Mackenzie, just south of the Arctic Coast. These mountains are known, respectively, as the Richardson, Buckland, British, Romanzof, and Franklin Mountains, but in reality they are the western extension of the main Rocky Mountain range that bends west from the Mackenzie along the Arctic Coast. On reaching the neighborhood of these mountains, however, in the winter of 1898-99, all hope of finding living specimens of Musk-Ox in them was destroyed.

The Romanzof Mountains, from which specimens of Musk-Ox are reported to have recently been brought, by way of Camden Bay, are about one hundred and seventy-five miles west of Herschel Island. The Pacific Steam Whaling Company, with offices at No. 30 California Street, San Francisco, have maintained a whaling station at Herschel Island for a number of years ; there has also been established there for a number of years a Church of England Mission, under the direction of the Rev. I. O. Stringer. I visited Herschel Island in November and December, 1898, for the purpose of collecting all possible information relative to the animal life of those regions. On my way to and from Herschel Island I sledged the very base of the Davis Gilbert, Richardson, and Buckland Mountains. I stopped over night on both journeys with a lot of Eskimo, at that time hunting the Davis Gilbert Mountains and living in what is known as Oakpik (willow camp), in the extreme western part of the Mackenzie delta, very near the foot of the mountains. Specimens of *Ovis dalli* (White Sheep) and of Caribou and fur-bearing animals were plentiful in their camp, but there was no sign of Musk-Ox.

At Shingle Point, on the Arctic Coast, near the Richardson Mountains, I spent several days with a man who was trading with the Eskimo who were hunting the Richardson Mountains. There were several Eskimo in his camp at the time, and he had in his possession skins of the White Sheep, Caribou, and a variety of fur-bearing animals, but there was no sign of Musk-Ox, and I learned on careful inquiry through my interpreter that the natives seemed to know nothing of them, with the exception of one young man who had been to

the eastward on one of the whaling ships. The Tooyogmioots, a tribe of Eskimo who once lived along this coast and hunted these different mountains, are now almost extinct. I found between the mouth of the Mackenzie and Herschel Island a very few individuals living in snow houses, but I did not find in or around their places of residence any sign of Musk-Ox skins, bones, or heads.

I remained at Herschel Island from Nov. 24 to Dec. 14, visiting the Rev. I. O. Stringer and Capt. Haggerty of the steam-whaler 'Mary Dehume.' Both men were able to converse readily with the Eskimo in the Eskimo tongue, and they gave me every possible assistance in making my inquiries. This whole coast far to the westward of Herschel Island is now occupied by the Noonitagmioot tribe of Eskimo. There were a large number of these people at the island, and among them were parties who hunted all the mountains of the mainland mentioned, living in the mountains a great part of the time. Many skins of Caribou, Sheep, and fur-bearing animals were seen in the possession of these people, but none of them possessed any part of the Musk-Ox, and the only members of the tribe who knew anything of the Musk-Ox were those who had been carried to the east by whaling ships. The Rev. Mr. Stringer takes great interest in the natural resources of the country and travels extensively among these people, but he had no knowledge of the existence of any Musk-Oxen west of the Mackenzie. Capt. Haggerty had wintered along this coast for a number of years, trading extensively with the natives, but he had never secured or heard of a Musk-Ox skin west of the Mackenzie.

All the whaling ships, which have wintered here for years, sometimes as many as fifteen at the same time, keep Eskimo hunters in the field continually for the purpose of securing fresh meat for the crews, sending white sailors in charge of dog sleds to visit the Eskimo camps to bring in the meat. It is not uncommon for these sleds to go one hundred and fifty to two hundred miles for meat, and all the mountains to the north and west of Herschel Island have been visited many times by these hunters and sledding parties, without obtaining any trace of Musk-Ox. Collinson, who wintered near Camden Bay in 1853-54, does not mention the Musk-Ox. The U. S. Government Survey party, which wintered on the Porcupine several years ago and visited Rampart House, a Hudson Bay trading post at the Ramparts on the Porcupine River, and who went from there with Mr. John Firth, the Hudson Bay Company's trader, north through these mountains to the Arctic Coast and returned, did not find Musk-Ox. Several white men have travelled back and forth through these mountains from Fort Yukon, on the Yukon River, to Herschel Island, for the purpose of securing sled dogs of the Eskimo on the Arctic Coast, to be used on the Yukon, without securing or learning anything of the Musk-Ox. Mr. Hodgson and Mr. Firth, both in the service of the Hudson Bay Company, have been stationed at Fort Yukon at the mouth of the Porcupine, at Rampart House on the Porcupine, and at Lapierras House on Bell River, a tributary of the Porcupine, during a period of over thirty years, trading with the Loucheaux Indians, several tribes of which hunt north of these places into the mountains mentioned, without ever obtaining any knowledge of the existence of Musk-

Ox; and the Hudson Bay Company have never secured at any of these posts any skins of the Musk-Ox.

Previous to the advent of the whalers on this coast, the coast Eskimo also traded at these Hudson Bay posts. The country between the Porcupine River and the Arctic Coast, in which district the mountains above mentioned are situated, is entirely accessible from the north or south, and every part of it has been hunted for years by the Eskimo and Indians. Barter Island, near Camden Bay, has been the rendezvous of the north coast Eskimo for years, where they meet every summer to barter and trade with each other. At one of these mid-summer festivals there may be seen spotted Reindeer skins from Siberia, Walrus ivory and Walrus skins from Bering Sea, or the stone lamps from the land of the Kogmoliks (the far-away people) of the East, and it is not impossible, though hardly probable, that Musk-Ox skins might be found there.

I also travelled through the country of the Kookpugmoots and Abdugmoots of the Arctic Coast, east of the Mackenzie. The first people encountered along the coast east of the Mackenzie are the Kookpugmoots—they hunt the coast country as far east as Liverpool Bay, but many of their best hunters never saw a Musk-Ox. The Abdugmoots originally hunted the Anderson River country, but now live around Liverpool Bay, and most of them have hunted Musk-Ox. The Kogmoliks, who once lived around Liverpool and Franklin Bays, but who are now practically merged with the Kookpugmoots, along the shores of Allen Channel have been Musk-Ox killers.

A good many of the Port Clarence natives, living near Bering Straits, have killed Musk-Oxen, but only around the head of Franklin Bay and on Parry Peninsula, they having been taken there by whalers. Nearly all the whaling ships pick up Port Clarence natives, on their way north and east to the whaling grounds, and keep them with them until their return, perhaps thirty months later. Some of these vessels have wintered at Cape Bathurst and in Langton Bay at the head of Franklin Bay. Four of these vessels wintered in Langton Bay in 1897-98, and during the winter their Eskimo and sailors killed about eighty head of Musk-Oxen, most of which were taken on the Parry Peninsula. When I was at Herschel Island, in the winter of 1898, I saw forty of these skins in one of the warehouses of the Pacific Steam Whaling Company. They were the property of Capt. H. H. Bodfish of the steam whaler 'Beluga.'

The range of the Musk-Ox at the present time does not extend westward to within three hundred miles of the Mackenzie delta. Any information concerning the Musk-Ox gathered around Point Barrow and thence south to Bering Straits and Port Clarence, has been obtained from natives who have accompanied whaling ships to the East; and all the Musk-Ox skins that find a market in San Francisco have been purchased, directly or indirectly, from the whaling ships.

Very truly yours,

ANDREW J. STONE.



OVIPOS MOSCHATUS. ADULT MALE.





Oribos Wardi. Adult Male.



OVIBOS WARDI. ADULT FEMALE.







Oribos Wardi. Yearling Male.





Fig. 1. *Ovibos wardi*. Calf, a few weeks old, killed at Fort Conger, May 18, 1899.



Fig. 2. *Ovibos wardi*. Killed at Independence Bay, Greenland. From Peary's 'Northward over the Great Ice,' Vol. II. p. 477.



Fig. 1. *Ovibos wardi*. Old male, killed at Independence Bay, Greenland. Front view of head, showing white band behind the horns, and the very light color of the whole head. From Peary's 'Northward over the Great Ice,' Vol. II, p. 472.



Fig. 2. *Ovibos wardi*. Old male, killed at Independence Bay, Greenland. From Peary's 'Northward over the Great Ice,' Vol. II, p. 475.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" IX, 1897.....	" 4.75
" III, 1890-91.....	" 4.00	" X, 1898.....	" 4.75
" IV, 1892.....	4.00	" XI, Part I, 1898.....	1.25
" V, 1893.....	" 4.00	" " II, 1899.....	2.00
" VI, 1894.....	" 4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00	" XIII, 1900.....	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May 1899. Price \$2.00.

(Continued on 3d page of cover.)

*Description of a New Caribou from Kenai
Peninsula, Alaska.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIV, ARTICLE X, pp. 143-148.

New York, May 28, 1901.

The Knickerbocker Press, New York

**Article X.—DESCRIPTION OF A NEW CARIBOU FROM
KENAI PENINSULA, ALASKA.**

BY J. A. ALLEN.

FOUR TEXT FIGURES.

In September and October, 1900, Mr. Andrew J. Stone made an important collection of large mammals for the American Museum of Natural History on the Kenai Peninsula, Alaska, including a good series of Moose (*Alces gigas* Miller), several specimens each of two species of Bears, and the head of the new type of Caribou here described. Unfortunately the entire animal could not be preserved. In recognition of Mr. Stone's important contributions to our knowledge of the distribution of the large game of northern North America, and particularly of Caribou, it may be called

***Rangifer stonei*, sp. nov.**

Type, No. 16701, ♂ ad., head (skin and skull), Kenai Peninsula, Alaska, Sept. 24, 1900; Andrew J. Stone.

Adult Male, in September.—Front of nose back to middle of nostrils, chin, and edges of lower lip grayish or silvery white; top of the nose, from the white muzzle back to a point opposite the eyes, black, passing into dark (blackish) brown posteriorly and on the sides of the head to below the eyes; cheeks and throat still lighter brown; a narrow space surrounding the eye and tear duct grayish; top and sides of neck dark grayish brown, becoming lighter and grayer at the base of the neck, and then abruptly darker in front of shoulders (skin of body not preserved); front of neck white, forming a longitudinal sharply defined band 100 to 130 mm. wide, of greatly lengthened white hair, in strong contrast with the sides of the neck; the white hair attains a length, along the median line, of 200 to 225 mm.

Measurements.—Mr. Stone's measurements of the animal in the flesh are as follows: Total length 85 in. (= 2159 mm.); tail, 6 in. (= 152 mm.); tarsus, 23 in. (= 584 mm.); height to elbow, 28 in. (= 711 mm.); height to brisket, 31 in. (= 712 mm.); height to withers, 52 in. (= 1321 mm.).

Skull.—The skull is narrow and slender in comparison with even that of *R. montanus*, and is further characterized by the slenderness of the antlers, especially the narrowness of the palmated portions, and the unusual development of the brow antler and the anterior branch.



Fig. 1. *Rangifer stonei*. About $\frac{1}{10}$ nat. size.

COMPARATIVE MEASUREMENTS OF SKULL.

	R. stonei. ♂ ad.	R. montanus. ♂ ad.	R. grœnlandicus. ♂ ad.
Basal length.....	410	420	375
Tip of premaxilla to tip of nasal.....	125	125	115
“ “ “ “ alveolus of p ¹	146	148	121
Length of nasals.....	116	123	111
Breadth above m ²	116	127	115
Zygomatic breadth.....	153	148	141
Mastoid breadth.....	158	149	126
Palatal breadth at m ¹	67	73	61
Depth of skull between antlers.....	110	112	94
Upper toothrow, crown surface.....	95	99	98
Diastema (canine to p ¹).....	72	72	55
Distance between antlers below the burr.....	68	78	64
Length of mandible, incisive border to angle.....	310	330	280
Angle to tip of coronoid.....	135	148	148
Depth at m ₂	37	38	32
Length of lower toothrow.....	105	103	97
Diastema.....	124	130	100
Antlers, main beam to tip, along curvature.....	1170	1235	1000
“ greatest spread at point of palmation.....	800	875	860
“ distance between tips of longest tines.....	900	790	655
“ “ “ points at tip of main beam.....	780	555	575

Rangifer stonei is a striking member of the Caribou group, resembling *R. montanus* in its dark coloration, but differing in the great development of the heavy fringe of white hairs on the front of the neck, and its striking contrast in color with the adjoining portions of the neck. Should this prove constant it will form an easily distinguishing mark. The antlers, fully illustrated in the accompanying figures (Figs. 1-4), from photographs,¹ recall in some respects those of the Barren Ground forms of Caribou (including *R. grœnlandicus*), but they are much heavier, with better developed and more numerous tines, a special feature of differentiation being the large size and peculiar form of the anterior branch. The skull is long and slender, the facial portion especially narrow, the occipital broad, the nasals short, and the lower jaw slender.

¹ The photographs are made to the same scale as those illustrating my paper on the Mountain Caribou (this Bulletin, XIII, pp. 1-18), and I am indebted for them, as before, to the skill of Mr. J. Rowley.



Fig. 2. *Rangifer stonei*. About $\frac{1}{10}$ nat. size.



Fig. 3. *Rangifer stonei*. About $\frac{1}{10}$ nat. size.

According to Mr. Stone the specimen here described is an average adult male, the hunters claiming that they often get much finer heads. Caribou, he says, are already very scarce on the Kenai Peninsula, and will doubtless soon be exterminated, the region being greatly frequented by visiting sportsmen, while native hunters kill the Moose and Caribou for their heads, disposing of them at good prices for shipment to San Francisco.



Fig. 4. *Rangifer stonei*. About $\frac{1}{2}$ nat. size.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" IX, 1897.....	" 4.75
" III, 1890-91.....	" 4.00	" X, 1898.....	" 4.75
" IV, 1892.....	" 4.00	" XI, Part I, 1898	" 1.25
" V, 1893.....	" 4.00	" " " II, 1899	" 2.00
" VI, 1894.....	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	" 4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May 1899. Price \$2.00.

(Continued on 3d page of cover.)

*A Preliminary Study of the North
American Opossums of the Genus
Didelphis.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIV, ARTICLE XI, pp. 149-188.

New York, June 15, 1901.

The Knickerbocker Press, New York

Article XI.—A PRELIMINARY STUDY OF THE NORTH AMERICAN OPOSSUMS OF THE GENUS DIDELPHIS.

By J. A. ALLEN.

PLATES XXII-XXV.

CONTENTS.

Introduction	149
Skull and Dentition	152
Sexual Variation	153
Variation due to Age, etc.	155
Nasal Bones	157
Supernumerary Teeth, and other Abnormalities	158
Change in Color of the Ears with Age	159
Nomenclature	159
Synopsis of Species and Subspecies	160
Postscript	178
Tables of Measurements and Ratios	180

• INTRODUCTION.

The present paper relates primarily to the forms of the genus *Didelphis* occurring in Mexico and the United States, to which area my material is mainly limited. It embraces, however, a few specimens from Guatemala, Nicaragua, and Costa Rica, and many examples from the Cauca region of western Colombia, the Santa Marta region of eastern Colombia, and the island of Trinidad. For nearly all of the Mexican material, which forms the principal part of the collection, and much of that from the United States, I am indebted to the kindness of Dr. C. Hart Merriam, Chief of the Biological Survey of the United States Department of Agriculture, without the generous offer of which this paper would not have been undertaken. The Mexican specimens were nearly all taken by Messrs. E. W. Nelson and E. A. Goldman, so well known for their explorations in Mexico and Guatemala. I am also indebted to Mr. G. S. Miller, Jr., and the authorities of the National Museum for access to series of specimens from Yucatan, Guatemala, and Costa Rica.

The specimens examined number about 350 skins and nearly 100 additional skulls, of which 115 skins and 40 additional skulls

are from the United States, 187 skins and 34 skulls from Mexico and Guatemala, 10 from Costa Rica, 26 from Colombia, 3 from Venezuela, and 12 from Trinidad. While this material far exceeds that previously available for the study of the group, it is very inadequate for more than a preliminary survey of the field. Besides the lack of material, the study of the group is rendered exceptionally difficult in consequence of the wide range of individual variation these Opossums present, and also by the peculiar character of the pelage, and the lack of any well defined pattern of coloration.

Beginning with the Opossums of the United States and proceeding thence southward to northern South America, several well marked features of variation are prominent. While at the North the animal is at about its average size, judged especially by the skull, there is found in proceeding from the North southward a very marked increase in the length of the tail, which in the northeastern States is less than 70% of the length of the head and body, while in tropical latitudes its length often equals the length of the head and body, sometimes exceeds it, and generally falls but little short of it. The ears are small in the northern animal in comparison with its southern representatives, in tropical examples the ear having far greater superficial area than in extreme northern specimens.

The coloration also varies markedly, not only as regards the pelage but in respect to the ears and tail. In the United States (the *D. virginiana* group) the dark basal portion of the tail generally extends little if any beyond the portion covered by the long hair at its base. In the Mexican and South American forms the dark color usually occupies the basal third, often one half, and sometimes two thirds of its length. In the northern animal the ears are black, tipped more or less broadly with flesh color, the amount decreasing southward, even to some extent within the United States; while in tropical latitudes the ears are wholly black in all the forms of the *Didelphis* group, except in *D. aurita* of southeastern Brazil, in which they are again tipped with flesh color, and in *D. pernigra* of Peru, in which they are wholly white.

The color of the feet also varies geographically, at the north the toes on all the feet being usually white apically, but the white extends further up the toes on the fore feet than on the hind feet.

Northern specimens have the nails and outer joints of the toes on the hind feet usually white, but the amount of white varies, being often restricted to one or the other of the hind feet, while the opposite one is entirely black, or, in Florida and the Gulf States, both hind feet may be black. The fore feet are always more or less white in northern specimens; in New York and New Jersey examples the toes are often white for their whole length, while at more southern localities, as in Florida and along the Gulf Coast, only the nails and terminal phalanges are white. In Mexican and South American specimens the toes on both fore and hind feet are wholly black.

Geographical variation in the character of the pelage is strongly marked. The northern animals (*D. virginiana* and *D. v. pigra*) have a long, soft, thick coat of woolly underfur, which is whitish basally for about four fifths of its length, only the longer fibres being tipped with black. Over this underfur is a thin covering of long, coarse, more or less bristly white hairs, usually sufficiently abundant to give a whitish coloration to the animal, through which the black apical zone of the underfur is more or less visible, producing a general grizzled effect. The whole head is white except a blackish eye-ring and a very small dusky spot in front of the eye, and a dusky area on the top of the head, terminating about midway between the eyes and the ears. In the tropical forms the pelage is much coarser, the coat of underfur less soft and full, and the black tipping involves about one third of the length of the underfur, which forms a conspicuous element in the superficial coloration. The long bristly white hairs, so abundant in the northern animal, are often replaced in the southern forms by bristly black hairs, the animal then being essentially black, a black phase and a gray phase often occurring at the same localities. In other words, the Opossums at many points south of the United States are dichromatic.

In southern specimens (*D. marsupialis* and *D. karkinophaga*, with their respective subspecies) the pure white cheeks alone represent the almost entirely white head of the *D. virginiana* group of the North. The white color of the cheeks is sharply cut off above by a dark band running from the base of the ear through the eye to the nose; the dark color of the top of the head forms a rather prominent median stripe, while the rest of the upper

surface of the head is tinged more or less strongly with dusky. There is usually a more or less well defined white area at the inner base of the ears, this with the white cheeks constituting the only white areas on the head. Often, however, the ear patches are obscured by a dusky wash.

A study of the skulls reveals an amazing amount of variation, dependent partly upon age and sex, but in large measure due to individual variation; there is, however, a considerable amount of geographical differentiation, most strongly shown in the form of the nasal bones. The variation in the form and size of the skull as modified by age is so considerable that it has been deemed worth while to illustrate this feature, as well as to give a few illustrations of individual variation, and of certain abnormalities of dentition. The halftone figures here given (Plates XXII-XXIV) are, with two exceptions (later duly indicated), one half natural size, and are from excellent photographs kindly taken for me by Mr. Frank M. Chapman, Associate Curator of the Department of Mammalogy and Ornithology.

The extensive array of measurements given in Tables I-VI at the end of this paper include about 15 measurements each of some 200 skulls of the genus *Didelphis*, and 4 external measurements of about the same number of specimens, taken in the flesh by the collector. These measurements, with the accompanying ratios, so well illustrate variations due to age, sex, and locality, as well as affording means for comparison of five species and as many additional subspecies, that they seem entitled to permanent record.

While the amount of material at present available is too limited, as already said, for even a very satisfactory reconnaissance of the group as regards its geographic forms, its careful study has yielded some results of considerable interest relating especially to the skull, dentition, and external characters.

SKULL AND DENTITION.

The skull in the Opossums of the genus *Didelphis* is remarkable for the great development of the sagittal and occipital crests, which become very highly developed in old age in both sexes. The deposition of bony matter appears to continue throughout the life of the animal, the skull increasing in its principal dimensions as long as the animal lives. At the time of the appearance

of the first upper true molar(m^1) the skull (then about 45 mm. long) is entirely smooth, without trace even of postorbital processes; by the time the third upper molar (length of skull now about 80 to 90 mm.) has come into use, the sagittal and occipital crests appear as low ridges about a millimetre in height. By the time the last upper molar has become functional the sagittal crest has attained a height of 4 or 5 mm. and the occipital ridges are proportionately developed. In middle-aged specimens the sagittal crest has usually attained a height of about 8 to 10 mm., which increases in old age to 12 to 14 mm., and the occipital ridges form a broad posteriorly projecting crest. (See Plate XXII.)

Sexual Variation in the Skull.

In the female the skull is of slighter build than in the male and averages about 10 per cent. smaller in external dimensions. It is narrower and slenderer, the zygomatic breadth decidedly less, the muzzle narrower, and the canines less strongly developed; nevertheless the sex cannot be distinguished with certainty from an examination of the skull, owing to exceptional variations in both males and females. Occasionally a female skull has the large size and heavy development ordinarily seen in the male, while, on the other hand, small male skulls are so slender and delicate as to exactly resemble the skull of the average female. In the general character of the dentition, aside from the usually weaker canines of the female, there is little difference in the sexes, and there is little or no difference in the relative development of the sagittal and occipital crests. While it thus happens that female skulls are sometimes larger than some male skulls strictly comparable with them as to age, it may be said that nearly all male skulls of the *D. virginiana*, *D. marsupialis*, and *D. karkinophaga* groups exceed 110 mm. in basal length, and that nearly all female skulls fall below this measurement. As indicating the relative size of males and females, and the geographical distribution of the larger skulls in the present series, the following tables may be of interest.

The 21 largest male skulls out of a series of about 200 are here listed, the two measurements given being the total length and the zygomatic breadth, with the ratio of breadth to length.

Total length. mm.	Zygomatic breadth. mm.	Ratio.	Locality.
139	68	49.2	Tumbala, Chiapas, Mexico.
136	69	50.7	Jico, Vera Cruz, "
134.5	68	50.5	Huehuetan, Chiapas, "
131	69	52.6	Hatteras, North Carolina.
131	69	52.6	Bay St. Louis, Miss.
131	65	49.6	Virginia Point, Texas.
131	67	51	Tehuantepec, Oaxaca, Mexico.
130	70	53.3	New Jersey.
130	67	51.5	Frontera, Tabasco, Mexico.
129	66	51	San Antonio, Texas.
128	72	56.2	Miller's Place, Long Island, N. Y.
128	68.3	53.3	Port Lavaca, Texas.
128	72	56.2	Vernon, Texas.
127	67.5	53	Armeria, Colima, Mexico.
125	63	50.4	Manzanillo, " "
124	66	53.2	Iowa Station, La.
124	60	48.3	Metlatoyuca, Puebla, Mexico.
124	70	56.4	Hatteras, North Carolina.
123	64	52	Tuxtepec, Oaxaca, Mexico.
122.5	69	56.3	Danville, Tenn.
122	63	51.6	Lake Harney, Fla.

The 12 largest female skulls from the same series are the following:

Total length. mm.	Zygomatic breadth. mm.	Ratio.	Locality.
120	58	48.3	Tuxtepec, Oaxaca, Mexico.
119	61.6	51.7	San Antonio, Texas.
118.5	55	46.4	" " "
118	62	52.5	Garrettsville, Ohio.
118	57	48.3	Golden City, Mo.
117	57	48.7	Riceboro, Georgia.
117	59.3	50.7	Manzanillo, Colima, Mexico.
116	60.5	52	Matagorda, Texas.
116	58	50	Velasco, "
114	55	48.2	Greytown, Nicaragua.
114	62.5	55	Montauk Point, Long Island, N. Y.
114	56	49	Tumbala, Chiapas, Mexico.

A comparison of these two lists, which consist in both cases of skulls much above average size, shows that the largest female skull is decidedly smaller than the smallest male skull; in males

the range in total length being from 122 to 139 mm., and in zygomatic breadth from 63 to 69 mm.; the corresponding ranges for the females being, respectively, 114 to 120 mm., and 55 to 62.5 mm. The ratio of the two measurements ranges from 48.3 to 56.4 in the males, and from 46.4 to 55 in the females.

From the preceding tables it will be seen that the largest skulls are dispersed over a wide geographic area, and that most of the extremely large skulls are from Mexico. This is due in part doubtless to the fact that in the unsettled portions of that region they are subjected to less persecution from man and thus more frequently live to very old age, than in the more settled regions of the United States. At all events, skulls bearing the marks of extreme senility are more frequent in the Mexican material than in that from the United States; yet certain skulls from North Carolina, Mississippi, and southern Texas stand well toward the head of the list, as regards both size and age.

Taking the whole series of skulls into consideration, it is found that some obviously *very old* male skulls measure down to 112 X 58.5 mm. (Armeria, Colima), and even as low as 107.5 X 52 mm. (San Juan Capistrano, Zacatecas), while some 'young adult' males fall as low as 95 X 46 mm. (Brownsville, Texas). Very old female skulls sometimes measure as low as 103 X 47 mm. (Teapa, Tabasco), and 'young adult' female skulls as low as 90 X 44 mm. (Mazatlan, Guadalajara, and Papantla.) The extreme range in very old males is therefore from 112 to 139 mm. in total length, and from 58 to 69 mm. in zygomatic breadth; and in very old females from 90 to 120 mm. in length and 40 to 62 mm. in zygomatic breadth. This indicates the amount of normal individual variation in cranial measurements that may be expected in any large series of skulls, even, it may be added, from practically the same locality.

Variation due to Age, etc.

There is not only a wide range of sexual, individual, and age variation in size and proportions in the skull considered as a whole, but, as would be naturally expected, also in its various parts, as in the form and relative stoutness of the zygomatic arches, the length and form of the palate, the nasals, etc., and in the size of the teeth. Without going into details, except in

respect to the nasals, to be considered presently, it may be said that the palate varies greatly in respect to the ratio of its breadth to its length, and in the relative development and form of its posterior border, the latter varying, especially with age, from a deeply concave to a straight outline; in old age it becomes built out posteriorly by bony deposition, and at the same time tends to become narrower. This change is parallel to the increasing narrowness of the skull, with advance in age, at the postorbital constriction, this region being broader in young adults than in middle-aged specimens, and still narrower in very old examples; for while the skull continues to increase in extreme dimension from middle life onward to old age, the postorbital region becomes more and more constricted, as is the case generally in animals in which the skull is normally greatly constricted post-orbitally.

The toothrow tends to become shorter, through normal processes of absorption, with great increase of age. There is, however, a rather wide range of variation in respect not only to its length, but in the size of the individual teeth in specimens from the same locality, strictly comparable as to sex and age, as shown later in the detailed tables of measurements. While in female skulls the teeth are generally smaller and more delicate than in the males, there are many exceptions to the rule, due to cases of marked individual variation in both sexes.

The lower jaw is as markedly subject to variation due to growth and age as is the skull in respect to size and the development of the sagittal and occipital crests. This is especially apparent in the angle formed by the coronoid process with the main axis of the jaw. During the evolution of the teeth the last molar appears, as usual, on the inner side of the anterior base of the coronoid, so that when the last lower molar has just come into use its posterior border is close to the anterior base of the coronoid. As the growth of the jaw continues after all of the teeth are in place, a space begins immediately to appear between the last molar and the anterior border of the base of the coronoid, which continues to increase with age as long, apparently, as the animal lives, so that in old age the last molar may be 6 to 10 mm. from the front border of the coronoid. With the increase in the length of the jaw, after practical maturity, and the coincident development of

the space on the alveolar border between the last molar and the front edge of the coronoid, a change occurs in the angle made by the coronoid with the horizontal portion of the ramus, the angle formed by the two axes becoming gradually more open or wider, due to the increased backward slope of the coronoid. This is a fact worthy of attention in comparing young adults with middle-aged or very old specimens. There is also often great individual variation in the slope of the coronoid in specimens of comparable age from the same locality.

Nasals.

Normally the nasals are narrow apically for a little more than half their length; then they abruptly expand, the expanded portion taking the form of a rhomboid, being diamond-shaped in outline; the expanded portion occupies a little less than one half the total length (about 42 to 48%). The transverse axis of this expanded portion varies from 75 to 100% of its longitudinal in different specimens from the same locality. The posterior half of the expanded portion may be pointed and symmetrical in outline, but usually it is shorter than the anterior half, and not infrequently the posterior border is abruptly truncated. The narrow anterior portion is of nearly equal width throughout, but the breadth varies in individuals from the same locality, the variation amounting to about 30% of the mean. (See Pl. XXIII, Figs. 1 and 2.)

The ratio of the nasals to the basal length of the skull varies in comparable specimens from the same locality from 46 to 58%. The ratio does not appear to be affected by age. The breadth varies proportionately more than the length, the breadth being correlated with the breadth of the rostral portion of the skull. Examples of narrow-nosed skulls and broad-nosed skulls from the same locality and of the same sex occur too frequently to render the difference of any importance as a trustworthy character in comparing small series of skulls from different localities. In two skulls from a single locality in Texas the nasals have a length respectively of 48.8 mm. and 52.9 mm., with a corresponding difference in the length of the rostrum, both specimens being middle-aged males. Yet, as will be shown later, the form of the nasals is sufficiently constant to afford a character of much importance in the discrimination of subspecies.

Supernumerary Teeth, and other Cranial Abnormalities.

In the present collection several cases of supernumerary teeth have been noticed, involving the true molars, premolars, and canines.

Molars.—Specimen No. 73492, adult male, Tehuantepec, has a supernumerary (fifth) true molar behind m^4 on both sides (see Pl. XXIII, Fig. 5); it is about half the normal height, and is patterned on the plan of m^4 , from which it differs mainly in its smaller size. In No. 77688, adult male, Huehuetan, Chiapas, there is a well developed fifth molar in the left side, similar in character to m^4 , but about one third smaller (Pl. XXIII, Fig. 6).

In No. 14614, adult female, Santa Marta, Colombia, m^4 on both sides is V-shaped, having two equal outer angles, and thus is practically of the same pattern as m^3 , except that it is shorter, and the middle cone of the outer border is suppressed.

No. 33831, young adult male, has on the right side a minute tooth about the size and shape of a small incisor, situated between m^1 and m^2 , in the outer border of the toothrow.

In several specimens teeth abnormal in position have been noticed, especially in the case of m^4 , which may be thrown inward, or backward, in the latter case leaving a space nearly the width of the tooth between it and m^3 . In general the outer edge of m^4 forms the most projecting portion of the toothrow, being even with or projecting slightly beyond the outer border of m^3 . In quite a number of cases m^4 is placed inward, so that the outer edge of m^3 projects considerably beyond m^4 .

Premolars.—Several instances have been noted of the occurrence of a minute supernumerary premolar, on one or both sides of the skull. Thus, in the skull last mentioned (No. 33831), there is a minute tooth on the left side between p^4 and m^1 , and another between m^1 and m^2 . No. 100507, young adult male, and No. 100508, young adult female, both from Frontera, Tabasco, each has a minute supernumerary tooth on the outer alveolar border between p^3 and p^4 on each side. There is also a similar development in No. 56857, adult male, and No. 58688, adult female both from Mirador, Vera Cruz. An old female from Rockport Texas, has a minute supernumerary tooth between p^3 and p^4 on each side, on the outer alveolar border.

Canines.—No. 45401, adult male, Bay St. Louis, Miss., presents a case of the nearly equal development of two canines on the left side (see Pl. XXII, Figs. 5 and 5a), not only similar in size, but also in form, standing close together, one behind the other. The two teeth have, at the alveolar border, nearly twice the longitudinal diameter of a normal canine.

CHANGE IN COLOR OF THE EARS WITH AGE.

Perhaps the most interesting feature of color variation is the change in the ears from flesh-color in the nursing young to black in the adult. Very young animals, from whatever locality, have the ears at first entirely flesh-color or yellowish white. In the North this is gradually replaced by black until the whole ear becomes black, except the apical border, which varies from a mere edging to an area half an inch in extent; while further southward, from the Rio Grande region throughout Mexico and to northern South America, the ears in the adult are entirely black. The change from the flesh-colored ear of the young to the black of the adult is gradual, the black generally beginning at the base and extending upward, as illustrated by a number of young specimens that have passed beyond the first stage.

In this connection I may be allowed to correct an error based on an examination of young specimens from Costa Rica which, having particolored ears, I identified some years ago¹ as *Didelphis aurita*. In the light of the present material, these specimens prove to be merely in the intermediate stage of color change in the ears, and have no relation to the true *D. aurita* of southern Brazil, which in the adult has the apical portion of the ears flesh-color, as in the Virginia Opossum of the North.

NOMENCLATURE.

The genus *Didelphis* of Linnæus is retained for the present group (cf. this Bulletin, XIII, 1900, pp. 185-190), the type being, by elimination, *D. marsupialis* Linn. The specific name *marsupialis* is restricted to the Mexican species, for reasons given beyond (pp. 163, 164); *D. karkinophaga* is retained for the forms occurring in northeastern South America, and *D. virginiana* for those of the United States.

¹ This Bulletin, III, No. 2, 1891, p. 217.

SYNOPSIS OF SPECIES AND SUBSPECIES.¹

- A. Posterior border of nasals forming a V-shaped point.
- a. Tail black only at extreme base; generally less than two thirds the length of head and body (tail ratio about 70).....*D. virginiana*.
 - b. Tail black for basal third; generally four fifths the length of head and body, or more (tail ratio about 90-95).....*D. marsupialis texensis*.
 - c. Tail black for basal one third to one half; generally as long as head and body or longer (tail ratio about 100-110).....*D. richmondi*.
- B. Posterior border of nasals obtusely truncated. Tail black for basal one third to one half, or more.
- a. Nasals very short and very obtuse posteriorly; tail generally about nine tenths the length of the head and body (tail ratio about 85-95)
D. marsupialis.
 - b. Nasals much longer and less obtusely pointed posteriorly (tail ratio 95-105).....*D. marsupialis tabascensis*.

***Didelphis virginiana* Kerr.**

VIRGINIA OPOSSUM.

Didelphis marsupialis LINN. Syst. Nat. ed. 10, 1758, 54. (In part only.)

Virginian Opossum, PENNANT, Hist. Quad. 1781, 301, no. 181, pl. xxxiv. (Excluding Mexican and South American references.)

Didelphis virginiana KERR, An. King. 1792, no. 386, p. 193. (Based on Pennant, as above.)

Didelphis virginiana SHAW, Gen. Zool. I, pt. 2, 1800, 473. (Based exclusively on the Virginia Opossum.) Also of most recent authors.

Didelphis woapink BARTON, Facts, Observations, and Conjectures relative to the Generation of the Opossum of North America, 1806, 2.

"*Didelphis pilosissima* and *illiniensium* LINK," apud Gray, List Mamm. Br. Mus. 1843, 100. (Cf. Thomas, Cat. Marsup. and Monotr. Br. Mus. 1888, 325, footnote.)

Type locality.—Virginia.

Distribution.—Eastern United States, south to the coast region of Georgia and the Gulf States.

Adult.—Pelage of two kinds of hair, an outer long coat of rather coarse white overhair, sufficiently abundant to give tone to the general coloration; beneath this a coat of long, thick, soft woolly underfur about 40 to 50 mm. long, on the back, white (sometimes nearly pure snowy white in clean winter specimens, but usually with a slightly yellowish cast) for four fifths of its length, the apical fifth of the longer fibres of the underfur being blackish. The long white overhair varies in abundance in different specimens and on different parts of the body, being nearly obsolete on the ventral surface, longer on the back than on the sides, and longest on the lower back and at the base of the tail, where it attains a length of 60 to 80 mm. General color above mixed black and white, the blackish tips

¹ *Didelphis nelsoni*, sp. nov., is not included; see postscript, p. 185.

of the underfur showing through the long overhair; the white basal portion of the underfur also shows through the blackish surface of the underfur; ventral surface white with a slight wash of dusky formed by the blackish tips of the hairs. There is generally a large pectoral area in adult males suffused with sulphur yellow, varying from a faint shade of this tint to quite strong greenish yellow, and varying also in respect to the size of the area. This pectoral spot is generally absent in young males and apparently always absent in the females. The fur over this area is often saturated with an oily, highly odorous secretion from underlying sebaceous glands, which are probably especially active during the breeding season. There is often a median ventral line of clear white, in both males and females, extending from the breast posteriorly, irregular in outline and extent in different specimens. Whole head, including the throat and sides of the neck, soiled white, or yellowish white, excepting the chin, which is usually darker and like the rest of the ventral surface. The sides of the neck are sometimes strongly tinged with buff. There is also a slight extension forward on the top of the head of the general dusky color of the dorsal surface, which usually forms a V-shaped area, extending to a point midway between the ears and eyes. It is indistinct in outline and varies greatly in intensity and extent in different individuals, being often absent, the head then being practically pure white. Eyes with a very narrow blackish eyering, widening anteriorly into a small, usually indistinct, preocular spot, sometimes nearly as large as the eye but often obsolete. Fore and hind limbs black the whole length except the toes, which on the fore feet are white for half or two thirds of their length, and on the hind feet for about one fourth their length. As a rule there is much less white on the hind toes than on the front toes, the hind toes frequently lacking the white on one foot and occasionally on both feet. The nails and soles of all the feet are yellowish or flesh-color in life. Ears black, broadly tipped with flesh-color (pale yellow in the dry skins), or narrowly edged with this color, occasionally nearly or quite lacking. Tail clothed for about two inches at the base with long hair like that of the body, the naked portion brownish flesh-color, except at the base, where it is blackish; the dark portion varies in extent in different individuals, but usually occupies only the part covered by the long hair. The pouch in the female is generally thickly lined with crinkled woolly hair, usually rufous brown.

Young.—Nursing young (250 to 350 mm. in total length) are blackish brown, finely grizzled with white hairs; under surface scantily clothed with very short blackish hairs; whole head clear white as far as the ears, with an incipient blackish eyering and anteorbital spot; ears, *wholly white*; feet and tail colored as in the adult. (See Plate XXV, Figs. 3, 4.)

Measurements.—Total length in middle-aged males, 750 to 875 mm.; head and body, about 450 to 520; tail, about 270 to 350; tarsus, 60 to 70; ears, about 50. Females somewhat smaller. Ratio of tail length to length of head and body, about 70 or less. For further detailed measurements, including measurements of skulls, see Table I.

Specimens examined.—The material available for examination has been received from the following localities:

[June, 1901.]

New York: Schoharie, 2; Fort Montgomery, 3; Highland Falls, 1; Hastings, 1; South Nyack, 1; Long Island, 4; New York City markets and Central Park Menagerie, 4, and 16 additional skulls (probably from Long Island and New Jersey).

Northern New Jersey: 6 adults and 10 young.

Pennsylvania: Erie, 1; Markelton, Somerset Co., 1.

Ohio: Garrettsville, 1 skin and 4 skulls; Wooster, 3 skulls.

Illinois: Warsaw, 1.

Maryland: Bethesda, 2.

Virginia: Dismal Swamp, 1; Dunn Loring, 2.

North Carolina: Hatteras, 4; Magnetic City, 1.

Tennessee: Big Sandy, 1; Clarkville, 1 skull; Danville, 1 skull; Roan Mountain, 1 skull.

Arkansas: Fayetteville, 2 skulls.

Missouri: Golden City, 1; Marble Cave, 1 (very young).

Kansas: Fort Leavenworth, 1; Cedar Vale, 3.

Indian Territory: Hartshorne, 2 adult and 6 very young; Savanna, 1; Red Oak, 2.

Oklahoma: Oklahoma City, 1.

Texas: Vernon, 1 skull; Gainesville, 1 skull; Brazos, Palo Pinto Co., 2; Kerrville, Kerr Co., 1 skull; Mason, 4; San Antonio, 6; Washington County, 1; Matagorda, 1; Deming Station, Matagorda Co., 3, and 1 skull; Virginia Point, Matagorda Co., 2; Velasco, Brazoria Co., 2.

Total 86, and 32 additional skulls.

Geographical Distribution.—So far as known the Opossum did not formerly range to the eastward of the Hudson River,¹ but of late years it has spread over Long Island and up the Hudson Valley as far as Schoharie, and is apparently not rare locally at various points in the lower Hudson Valley. It occurs also in the western part of New York, and thence westward, south of the Great Lakes, to Iowa, and thence southward to Texas. There are specimens in the present collection from eastern Kansas, Indian Territory, Oklahoma, and the Panhandle region of Texas, and as far south in the interior of Texas as Mason and San Antonio, and on the coast to about Matagorda Bay.

In the eastern United States it occurs locally, or at favorable points, from the Great Lakes southward nearly to the Gulf Coast and Georgia, merging in the southern part of its range into the southern darker form recently described by Mr. Bangs under the name *D. virginiana pigra*. Its range in Texas extends, in the interior at least, as far as San Antonio.

¹ Cf. Miller, 'Preliminary List of New York Mammals,' in Bull. New York State Museum, Vol. VI, No. 29, Oct. 1899, pp. 293-295.

General Remarks.—Northern specimens (New York and New Jersey) are lighter in coloration and have softer and more abundant and whiter underfur than those from the Middle States and further southward; the blackish V-shaped area on the top of the head becomes better defined and the incipient dusky spot in front of the eye more pronounced in passing from northern localities southward. As shown by the tables of measurements given beyond (see Table I), there is apparently very little geographical variation in size; a large series of specimens might show a decrease in size toward the northern border of the range of the species. The specimens at hand show a wide range of variation in size, due apparently to age rather than to locality.

The few specimens from west of the Mississippi River (Kansas, Indian Territory, Oklahoma, and central and northern Texas) do not differ appreciably from specimens from New York, Ohio, Tennessee, Maryland, and North Carolina; but the material for comparison is too scanty to warrant positive conclusions.

Nomenclature.—The nomenclature of this species, both generic and specific, has of late been the subject of considerable discussion. An attempt was recently made¹ to discard the generic name *Didelphis* on the ground that the species, *D. marsupialis* Linn.—necessarily its type through the process of elimination—was indeterminable. By this ruling *Didelphis* Linn. (1758) was replaced by *Sarigua* Muirhead (1819), and *D. marsupialis* Linn. (1758) was disallowed as being unrecognizable. To both of these rulings the present writer has taken exceptions.² Mr. Oldfield Thomas³ supports the retention of the name *Didelphis*,⁴ but expresses his preference for “retaining the familiar term *virginiana* for the Virginia Opossum.”

As to the proper specific name, however, the case is more complex. I have heretofore favored restricting the name *Didelphis marsupialis* of Linnæus to the Virginia Opossum, on the ground that the only reference given by Linnæus that is positively identifiable is his citation of Tyson, whose account is not only detailed

¹ Cf. Rehn, *Am. Nat.*, Vol. XXXIV, July, 1900, pp. 575-578.

² Cf. Allen, this Bulletin, Vol. XIII, 1900, pp. 185-190. In this article the date of Muirhead's genus *Sarigua*, as stated by Rehn, was claimed to be erroneous; that it should have been given as 1832 instead of 1819. As shown later, however, by Mr. Witmer Stone (*Science*, N.S. XII, No. 305, p. 685, Nov. 2, 1900), the correct date is 1819, as given by Mr. Rehn.

³ *Am. Nat.*, Vol. XXXV, Feb. 1901, pp. 144, 145.

⁴ Mr. Rehn also in a late paper (*Am. Nat.*, XXXV, Feb. 1901, pp. 147-149) admits the propriety of retaining *Didelphis* in place of *Sarigua*.

and accurate, but is known to have been based on specimens brought alive to England from Virginia. Besides this, there is no question of the applicability of his description and figures to this animal. On the other hand Mr. Thomas (*l. c.*, p. 144) claims that Seba's account, cited also by Linnæus and having precedence in the order of citation, is also identifiable and relates almost beyond question to the large Opossum of Guiana and northeastern South America, later named *Didelphis karkinophaga* by Zimmermann. Linnæus's *D. marsupialis*, as every one admits, was intricately composite, including all of the then known forms of the restricted genus *Didelphis* from both North America (including Mexico) and South America. Unfortunately the first form of the group to receive a new name was the Guiana species, as above stated. The next to receive a name was the Virginia Opossum, called *Didelphis virginiana* by Kerr in 1792. We have still left of the Linnæan references the Tlacuatzin of Hernandez, which undoubtedly relates to the form of *Didelphis* occurring in Mexico. It has, therefore, seemed best to restrict *D. marsupialis* to the large Mexican Opossum, as suggested by Rehn (*l. c.*, p. 149), retaining *D. karkinophaga* as the specific designation of the large Opossums of northeastern South America, and *D. virginiana* Kerr for the Opossums of the eastern United States, this course being not only warrantable, but scarcely disturbing the current nomenclature of the group. (Cf. also postea, p. 169.)

Kerr's name *Didelphis virginiana* was fortunately based on the "Virginian Opossum" of Pennant's 'History of Quadrupeds' and not on that of his 'Synopsis of Quadrupeds,' as in the latter case it would have been a pure synonym of *D. marsupialis* Linn. In the 'Quadrupeds' he so far modified the description first given in the 'Synopsis' as to make it not only strictly applicable to the Virginia Opossum, as regards coloration and the relative length of the tail, but he substituted a copy of Tyson's excellent plate of this animal for the very "indifferent" one in the 'Synopsis,' which represents a dark-headed, long-tailed South American form. There is, therefore, no ground for questioning the availability of Kerr's name, who simply paraphrased Pennant, even to his erroneous statement of its distribution.

Relationships.—*D. virginiana* merges gradually into *D. v. pigra* of the coast of Georgia, the Florida Peninsula, and the Gulf

Coast, diverging more perceptibly in Florida from the northern form, and reaching its extreme differentiation in the southern half of the Peninsula. South Florida specimens are, as already said, readily distinguished from New York and New Jersey specimens by strongly marked color differences, and perhaps by a slight average increase in the length of the tail.

In the Lower Rio Grande region of southern Texas there is apparently a rather abrupt transition from the *D. virginiana* type to the dichromatic form of the Lower Rio Grande region, both in coloration and in the relative length of the tail. Nevertheless it evidently diverges from the typical northern toward the southern animal near the southern border of its distribution in Texas.

Didelphis virginiana pigra Bangs.

Didelphis virginiana pigra BANGS, Proc. Boston Soc. Nat. Hist. XXVIII, 1898, 172. March, 1898.

Type locality, "Oak Lodge, on the east peninsula, opposite Micco, Brevard Co., Florida."

Distribution.—Florida, coast of Georgia, and Gulf Coast west to Texas.

Darker, but in all other respects similar to *D. virginiana*. The underfur has a much broader apical zone of black, the covering of white overhair is generally much reduced, the blackish face markings are more pronounced, the median extension of dusky on the head often extending as far forward as the front of the eyes, and the anteorbital spot is much larger. The white on the toes is much reduced, being often entirely absent on the hind toes, and the white on the apical border of the ears is often reduced to a mere trace; on the other hand the black at the base of the tail often extends considerably beyond the covered portion, particularly in South Florida examples, where there is also a tendency to melanism.

In measurements and proportions (see Table II of measurements) quite similar to *D. virginiana* of the northern States. In a series of 4 specimens from Kissimmee River, Fla., the ratio of tail length to length of head and body is 74.5.

D. virginiana pigra is not sharply or very strongly differentiated from *D. virginiana (typica)*, but South Florida and Louisiana coast specimens are quite unlike the northern form through their much darker general coloration, the increase in extent and distinctness of the facial markings, a tendency to a greater extension of black on the base of the tail, and the reduction of white on the toes and ears.

Geographical Distribution.—*D. v. pigra* may be considered as

occupying the whole of Florida, the lower coast region of Georgia, and the low Gulf Coast belt as far as western Louisiana. Specimens from the coast and interior of Texas, from about Matagorda Bay northward, seem better referable to true *D. virginiana*.

Specimens examined:

Georgia: Riceboro, 1; Beaufort Co., 5.

Alabama: Sylacuga, 4 skulls.

Mississippi: Bay St. Louis, 3.

Louisiana: Houma, 1; Lafayette, 1 skin and 1 adult skull.

Florida: Gainesville, 2; Lake Harney, 4; Fort Kissimmee, 2; Kissimmee River, 4—1 black; Little Marco, 1; Sebastian, 1; Key West, 1.

Total, 26, and 5 additional skulls.

Didelphis marsupialis Linn.

Tlacuatzin, HERNANDEZ, Anim. Mex. 1651, 330.

Didelphis marsupialis LINN. Syst. Nat. ed. 10, 1758, 54. (By elimination and restriction; see antea, p. 164.).

Didelphis californica BENNETT, P. Z. S. 1833, 40. Also of Baird and others.

Didelphis breviceps BENNETT, P. Z. S. 1833, 40.

Didelphys pruinosa WAGNER, Suppl. Schreber's Säug. III, 1843, 40 (foot-note), and V, 1855, 224 (as a syn. of *D. californica*).

Type locality.—Mexico; exact point not known. Valley of Mexico, by restriction.

Gray Phase.—An outer long coat of white bristly overhair, 60 to 80 mm. long over the middle of the back and on the rump; beneath this a coat of soft long underfur, white for about two thirds of its length, the apical portion black, the long white overhair and the black outer zone of the underfur giving a dark grizzled general effect. Cheeks pure white, with generally a whitish spot over each eye, and a whitish area surrounding the base of the ears; whole top of the head and nose dusky brown, varying in intensity in different individuals, with a blackish stripe running from the ear through the eye to the nose. Fore and hind limbs black, including the feet except the nails, which are yellowish white; upper part of the limbs more or less grizzled with long white overhair. Beneath the pelage consists mainly of the soft underfur, which is much shorter and thinner than on the upper surface, with the tips of the fur more or less tinged with dusky, and with a few long bristly overhairs. Ears entirely black. Tail black at the base, usually for one half or more of its length, the apical portion flesh-color.

Black Phase.—Long bristly overhair black instead of white, beneath which is the usual soft long underfur, white for its basal two thirds and tipped with black. In other respects as in the gray phase.

During the breeding season the pouch of the female is lined with fine,

crinkled, woolly hairs of a rusty chestnut brown color. During the non-breeding period the pouch hairs are often gray or even whitish.

In fresh pelage the underfur is nearly clear white or grayish white. Later it takes on a yellowish cast, sometimes becoming decidedly yellowish white, particularly on the head and anterior half of the body. The sides of the neck are often buffy, varying from pale buff to orange buff.

Young.—Above uniform black with generally a few white bristly hairs scattered over the dorsal surface. In very young specimens the underfur is dingy gray; as the animal increases in size and the pelage becomes longer, the underfur becomes white at base with a broad terminal zone of blackish. The head has a distinct color pattern, being white with a broad brownish black stripe running from the ear to beyond the eyes, and an extension forward over the top of the head of the blackish color of the body, terminating in a pointed area about opposite the eyes. In other words, the cheeks are white; there is a broad white spot at the inner posterior base of the ears, and a white band above the black band that runs through the eyes. The ears are entirely flesh-color to the base, changing gradually to black in the adult, the black usually beginning at the base and spreading toward the tips, but sometimes first appearing as dusky blotches irregularly dispersed. The feet and the basal portion of the tail are black as in the adults. (See Plate XXV, Figs. 1, 2.)

Measurements.—As shown by the measurements given in Table III, the total length of the animal ranges in adult specimens from 820 to 940 mm. in the male, and from 725 to 850 in the female. The adult skull ranges in total length from 112 to 136 in the male, and from 103 to 120 in the female. The ratio of length of tail to that of the head and body is generally between 85 and 90.

Specimens examined:

Tamaulipas: Alta Mira, near Tampico, 4 specimens—2 in black phase, 2 in gray phase; also 1 additional skull.

Nuevo Leon: Monterey, 4,—1 black, 3 gray.

Chihuahua: Batopilas, 1, black.

Sonora: Hermosillo, 1, black.

Sinaloa: Sierra de Choix, 1, gray; Culiacan, 1, black; near Mazatlan, 2—1 black, 1 gray; Rosario, 1, gray; Escuinapa, 1, black.

Durango: Chacala, 1, black.

Zacatecas: San Juan de Capistrano, 1, gray.

Tepic: Tepic, 2—1 black, 1 gray.

Jalisco: Ameca, 2 skulls; Atemajac, 2, gray; Zapotlan, 1, gray; San Sebastian, 1, black; Etzaplán, 11,—all very young, in first (black) pelage; Guadalupe, 8, all gray, and 29 young, one fifth grown, in alcohol.

Colima: Armeria, 6—4 black, 2 gray; Manzanillo, 9, all black; also 3 additional skulls from Armeria and 7 from Colima.

Michoacan: Querendaro, 3, gray; Patzcuaro, 1, gray; Hacienda El Motino, 2, gray.

Guanajuato: Celaya, 1, black.

Queretaro: Jalpan, 1.

Hidalgo: Pachuca, 2, and 3 additional skulls; Rio del Monte, 1; Ixmiquilpan, 1; Tulancingo, 1, young; all the adults are in gray phase.

Mexico: Tlalpán, 3; Ameca, 1; Salazar, 1; all in gray phase.

Morelos: Yautepec, 1, gray.

Puebla: Atlixco, 2; Metlaltoyuca, 2; Chalchicomula, 1; Huanchinango, 1; San Martín, 1 (and 1 additional skull); all in gray phase.

Vera Cruz: Jico, 1, black; Las Vegas, 1, gray; Maltrata, 1; Minatitlán, 2; Orizaba, 2, gray, and 2 additional skulls.

Guerrero: Acapulco, 6—4 black, 1 gray, and 1 pure albino.

Oaxaca: Tuxtepec, 2 gray, 2 very young, and an additional skull; Cuicatlan, 1, gray; Oaxaca, 1, gray; Reyes, 3 gray, and 1 skull; San Domingo, 1, black; Tehuantepec, 2—1 black, the other gray.

Total, 106 skins, 22 additional skulls, and 29 young in alcohol.

Geographical Distribution.—The northern limit of the range of the *D. marsupialis* (= *californica* auct.) group begins on the coast of Texas near Nueces Bay, and doubtless occupies the coast region thence southward to Guatemala, and the interior tablelands across Central Mexico to the Pacific Coast, ranging on the west coast from the southern part of Sinaloa to Guatemala. The northern limit of its range in Mexico has not been definitely ascertained, but there are no specimens in the present collection from the northern tier of States, except from near their southern border. The most northerly points represented are Monterey, in Nuevo Leon; Hermosillo, in central western Sonora; and Sierra de Choix in the extreme northern part of Sinaloa. There is no record of the occurrence of any form of Opossum along the southern border of the United States west of Texas, the early vague references to the occurrence of *D. californica* in California being unsupported by modern research.

The number of specimens of this group at present available for study is about 220. Large portions of Mexico that are doubtless inhabited by this animal are entirely, or almost entirely, unrepresented, as, for example, the State of Tamaulipas, from which there are only a few specimens, from the vicinity of Tampico. Nuevo Leon is represented by only four specimens, from Monterey. There are none from Coahuila. Chihuahua is represented by a single specimen from near Batopilas, and Sonora by a single specimen from Hermosillo. The specimens from Sinaloa are all but one from near the coast of the southern portion. Several of the interior States also are practically unrepresented, as San Luis

Potosi, Durango, Guanajuato, and Queretaro, these States being each represented by a single specimen. There are numerous specimens from several points along the western coast, as Acapulco, Manzanillo, Colima, Armeria, and Mazatlan.

As shown later, a separable form occupies the Lower Rio Grande Valley, and another the coast region of Vera Cruz, Tabasco, and Chiapas.

Nomenclature.—As already shown (p. 164), it seems best to adopt, by the usual method of elimination for composite groups, Linnæus's name *D. marsupialis* for the large Mexican Opossums, considering the name as tenable on the basis of the Tlacuatzin of Hernandez, cited by Linnæus. While no definite type locality can be assigned, we may assume it to be that portion of Mexico known to Europeans at the middle of the seventeenth century, and hence assume as the type locality the region about the city of Mexico. The name heretofore usually employed has been *Didelphis californica* Bennett, based on a specimen "from that part of Mexico which adjoins California." The specimen was collected by Douglass on his journey across Mexico, but no definite localities have ever been given for the types of the various species of mammals based on the collections made by him during this trip. If they were taken in northwestern Mexico, as generally supposed, they must have been obtained from localities quite remote from the present State of California.

Mr. Bennett described in the same paper a *Didelphis breviceps*, also based on a specimen collected by Douglass. The alleged differences in respect to the proportions of the head with reference to the position of the ear might easily be due to bad taxidermy. In other respects the two alleged species agree very well for animals of this group. *D. pruinosa* Wagner was described from a specimen from "Mexico," no definite locality being indicated.

The specimens on which these supposed species were based were all in the gray phase of pelage, and are characterized by the great length of tail peculiar to the large Mexican Opossum. *D. breviceps* and *D. pruinosa* must apparently be construed as pure synonyms of *D. californica*, which name is here referred to *D. marsupialis* Linn. (restr.).

The *D. marsupialis* group, as thus restricted, is separable into several geographical races or subspecies, some of which can be

predicated on the basis of the present collection, while doubtless others will be made known later when a much larger amount of material, covering more completely the range of the group, and embracing proper series from a large number of localities, becomes available for elaboration. None of the names above cited can refer to any of these forms, but should the animal of the west coast of Mexico prove to be separable from that of the interior, as seems not improbable, Bennett's name *californica* may be employed for it, as it seems likely that Bennett's specimens were obtained there by Douglass.

Relationships.—It seems preferable to treat the Mexican *D. marsupialis* group as specifically separable from *D. virginiana* of the United States, although the characters that distinguish the two are mainly differences of degree, or comparative rather than absolute. The chief features of distinction between the two forms, are (1) the greatly increased length of tail in the *D. marsupialis* group, with the basal half, instead of only the extreme basal portion, black; (2) absence of white on the toes; (3) absence of white on the ears, although a slight white edging seems liable to crop out sporadically throughout the range of the species; (4) the increased width of the apical black zone of the underfur, which gives even in the gray phase a darker general effect to the coloration; and (5) the grayish dusky color of the whole front of the head, including the top and sides of the nose, and the presence of a well developed ocular stripe. In respect to the characters of the skull, the Texas specimens of the *D. marsupialis* group do not seem to differ appreciably from specimens of *D. virginiana* from central and northern Texas and elsewhere in the United States.

The relationship of *D. marsupialis* to the southern forms of the genus cannot be satisfactorily determined, owing to insufficient material from Central America. A series of four specimens from Nicaragua, however, and a few from Costa Rica, indicate an animal quite different from *D. marsupialis*, through its more slender form, as shown in the total length of the animal, in the higher ratio of tail length to that of the head and body, and in the narrower and longer skull, and also in the pointed form of the posterior border of the nasals. (See Plate XXIII, Fig. 5, and Plate XXIV, Fig. 3.)

Moult, and Variation with Age and Season.—In young specimens the first pelage consists of very short woolly hair, at first almost wholly blackish. As the hair increases in length it becomes lighter at the base, and later nearly pure white for about two thirds of its length. When the animal is a few weeks old the long coarse overhair begins to appear, being white or black according to the phase. By the time the animal is one fifth grown its pelage is similar to that of the adult and there is no further change except what results from fading and wear.

The present series of specimens does not afford satisfactory material for a complete study of the moult. From October till February the pelage is generally full and long. In March it often shows signs of wear, and by April becomes exceedingly worn and ragged. At the same time new hair can be seen coming in, at first in patches where the old pelage has been removed by accident. April and May specimens generally show new hair coming in, but whether a full summer dress is acquired remains uncertain. Through individual idiosyncrasy specimens occur sporadically from January to July that are very much worn, but in general there appears to be a renewal of the coat in April and May. August to September specimens also show new growth of hair, which continues to come in, at least in certain specimens, till late in October. By the end of October the full winter coat has generally been attained. It is interesting to note that the underfur in the new fresh coat is often nearly clear white, this condition occurring at widely separated localities. Later the underfur commonly takes on a slightly yellowish cast, which becomes more pronounced as the season advances, so that specimens in worn condition often have the underfur decidedly yellowish white, and the white overhair is often soiled or stained dingy yellowish. Quite a number of specimens, from various and widely separated localities, have the underfur of the head, neck, and shoulders quite deep buff, and the rest of the underfur more buffy than usual, due apparently to adventitious staining.

Dichromatism.—The large Mexican Opossums of the *Didelphis marsupialis* group are, like those of the *D. karkinophaga* group, subject to dichromatism, they presenting a gray phase and a black phase similar to the gray and black phases so well known to occur in various species of Squirrels. While the two phases

appear to be somewhat localized, they often occur together, specimens of each being collected at the same localities at practically the same dates. In the black phase the long overhair is black, but of about the same length and coarseness as the white overhair in the gray phase. The white overhair is more conspicuous owing to its contrast with the black surface of the underfur. In only a few instances do we meet with a mixed condition in which both coarse black and white hairs are intermixed. In such instances the white hair is very scanty and scattered. The gray phase appears to predominate throughout the interior of Mexico, including the whole tableland region, whence very few black specimens are represented in the present series. On the other hand, in the lower Rio Grande region of Texas, and along the eastern coast of Mexico, from southern Tamaulipas southward, and along the whole west coast from Guatemala to Mazatlan, the black phase is common, and at some localities appears to predominate.

***Didelphis marsupialis texensis*, subsp. nov.**

Type, No. $\frac{221133}{1337}$, Biol. Surv. Coll. U. S. Nat. Mus., ♂ ad., Brownsville, Texas, April 13, 1892; F. B. Armstrong.

Similar in coloration to *D. marsupialis (typica)*, but with a relatively longer tail, longer nasals, usually terminating posteriorly in an acute angle, instead of being rounded or more or less abruptly truncated on the posterior border.

Measurements.—Type, total length, 820 mm.; head and body, 410; tail, 410; tarsus, 70; ear, 50. Adult males range in total length from about 780 to 820 mm., and adult females from about 700 to 730 mm. The ratio of tail length to the length of head and body ranges, in normal specimens, from about 85 to 100. (For additional measurements see Table IV.)

Skull.—The nasals, with individual exceptions, terminate posteriorly in a pointed angle, the portion anterior to the point of greatest expansion being as long as, or a little longer than, the anterior half of the basal rhomboid.

Geographical Distribution.—The coast region of Texas, from Nueces Bay southward, and the Lower Rio Grande Valley, as far up the valley at least as Del Rio, Val Verde County. Sporadically northward to San Antonio, at which point *D. m. texensis* occurs with *D. virginiana*, the latter greatly predominating. It doubtless ranges somewhat to the southward of the Rio Grande, but there are no specimens available for examination from between Brownsville and Tampico.

Dichromatic, the black phase, in the material examined, prevailing in the ratio of five to one of the gray phase, as shown by the following record of

Specimens examined:

Texas: San Antonio, 2, black phase; Rockport, 3—2 in black phase, 1 in

gray phase; Corpus Christi, 4, black phase; Nueces Bay, 2, black phase Alice, 1, black phase; Sycamore Creek, 1, black phase; Del Rio, 2—1 in black phase, 1 in gray phase; Eagle Pass, 1, black phase; Fort Clark, Kinney Co., 8—4 black and 4 gray; Brownsville, 6—3 in black phase and 3 in gray phase. Also additional skulls.

Mexico: Matamoras, 1.

Total, 31, and 7 additional skulls.

Didelphis marsupialis texensis differs markedly from *D. virginiana* in the color and markings of the head, and in its much longer tail, but presents no notable cranial differences. It differs from *D. marsupialis* in the form of the nasals, in its somewhat longer tail, and in the great predominance of the black phase, the prevailing phase in *D. marsupialis* being gray.

***Didelphis marsupialis tabascensis*, subsp. nov.**

Type, No. 100512, Biol. Surv. Coll. U. S. Nat. Mus., Teapa, Tabasco, Mexico, April 7, 1900; E. W. Nelson and E. A. Goldman.

A long-tailed form, with very long nasals, terminating posteriorly in a somewhat pointed angle. Apparently not very different in coloration from *D. marsupialis (typica)*. Based primarily on seven specimens from Teapa and Frontera, Tabasco, to which are typically referable two from Papantla, three from Catemaco, and five from Mirador, Vera Cruz; also 25 from various localities in Chiapas and Guatemala, and 5 from Merida, Yucatan. Of these specimens rather more than one half represent the black phase. The February specimens are in fairly good winter pelage; the others, which were nearly all taken in April, are more or less worn. In many of the specimens the underfur, the sides of the neck, and the cheeks are more or less yellowish, in some of them strongly so, and in the Mirador specimens the buff tinge is especially strong, being deep buff on the head, neck, and front half of the body, and pale buff on the posterior half. Apparently, however, this strong buff tint is due to adventitious staining.

Measurements.—Type, total length, 902 mm.; head and body, 460; tail, 442; tarsus, 69; tail ratio, 96. Six males range from 850 to 919 in total length, and 415 to 463 in tail length, with a tail ratio of 95 to 107. Four females range in total length from 811 to 886, and from 368 to 431 in tail length, with a tail ratio of 95 to 112. (For further measurements, including measurement of skulls, see Table V,

Specimens examined:

Tabasco: Teapa, 5—3 black, 2 gray; Frontera, 2, black, and 1 skull.

Vera Cruz: Mirador (near Vera Cruz), 5—1 black, 4 gray, and 1 skull; Catemaco, 2—1 black, 1 gray, and 1 skull; Papantla, 2, gray.

Chiapas: Tumbala, 4, gray; San Cristobal, 1, gray; Ocozuatlan, 1 gray; Tajalon, 1, gray; Valley of Comitán, 1, gray; Ocuilapa, 1, gray;

Huehuetan, 7—3 black, 4 gray, and 3 additional skulls; Tuxtla, 5—1 black and 4 gray.

Guatemala (near Chiapas border): Jacaltenango, 3, black; Nenton, 1, gray; Escondido River, 1, very young; "Guatemala," without special locality, 4—3 gray, 1 black.

Total, 46 and 5 additional skulls.

Didelphis marsupialis tabascensis is a very strongly marked form, ranging, so far as present material shows, from the vicinity of Vera Cruz to Frontera, Tabasco, and across the State of Chiapas to northern Guatemala. The character of the long nasals, terminating posteriorly in a V-shaped angle, runs throughout the series with a small number of exceptions, while the specimens from the immediately adjoining localities to the northward and westward, in the States of Vera Cruz and Orizaba, are almost uniformly characterized by short nasals more or less truncated posteriorly. The form of the nasals is thus much as in *D. virginiana* and *D. m. texensis*, or even in *D. richmondi* from Nicaragua and Costa Rica. The increase in the length of the nasals, in this as in other forms with long nasals, is not due to any increase in the length of the rostral portion of the skull but to the greater posterior extension of the nasal bones.

The variation in the form of the nasals in *D. marsupialis* and its subspecies is summarized, in comparison with *D. virginiana*, in the following tabular statement:

RATIO OF NASALS TO THE BASAL LENGTH OF SKULL.

	No. of Specimens.	Locality.	Ratio.
<i>D. virginiana</i>	32	Northern United States	51
<i>D. v. pigra</i>	16	Florida	50.4
<i>D. marsupialis</i>	4	Tamaulipas	47
" "	7	Oaxaca	45.6
" "	1	Puebla	48.7
" "	6	Hidalgo	49.1
" "	7	Guerrero and Michoacan	47.9
" "	15	Colima	47.5
" "	10	Jalisco	46.3
" "	6	Sinaloa	49
<i>D. m. texensis</i>	15	Rio Grande Valley, Texas	50.5
<i>D. m. tabascensis</i>	14	Vera Cruz (coast region)	50.8
" " "	7	Tabasco	51.2
" " "	9	Chiapas	51.3

***Didelphis richmondi*, sp. nov.**

Type, No. $\frac{381136}{481140}$, U. S. National Museum, ♀ adult, Greytown, Nicaragua, Feb. 7, 1892; collected by Dr. Charles W. Richmond.

Adult.—The long bristly overhair is black and yellowish white, that of the nape and shoulders mainly black, in contrast with that of the rest of the dorsal surface; generally the white overhair is more abundant than the black; underfur coarse, yellowish white for the basal two thirds tipped with black; extreme basal half dingy greenish orange; sides of the head to the posterior base of the ears soiled pale buffy white, separated by a distinct median stripe of black running forward to a little beyond the eyes; an ocular band of blackish, running from the ear to the base of the whiskers; cheeks soiled buffy white; underparts with the pectoral area, including the sides of the neck, buffy at the surface, with the pelage brownish yellow of the basal two thirds; legs and feet black; nails yellowish white; ears wholly black; tail with the basal half black, the rest flesh-color.

Young.—A young specimen, about one fourth grown, is similar to the adult, except that the coarse overhair is more abundant, and it presents the same contrast of black predominating anteriorly and yellowish white posteriorly. The underfur is stained deep orange buff as in the adult; lower parts deeper buff than in the adults without the dusky tipping to the hairs.

Measurements of type.—Total length, 948 mm.; head and body, 471; tail, 477; tarsus, 70. Skull, total length, 114; basal length, 104; nasals, 54; zygomatic breadth, 55; length of palate, 65; upper tooththrow, 37.4. (For additional measurements see Table V.)

This species is based on four skins with skulls and two additional skulls, from Greytown, Nicaragua, collected by Dr. Charles W. Richmond, for whom the species is named. The skins comprise three adult females and a young male about one fourth grown. Three of the specimens are quite similar in coloration, having a well defined median black stripe on the head and a dusky stripe from the ear through the eye to the base of the whiskers, between which markings the color is pale buffy white. Another adult in very worn pelage is similar in markings, but almost entirely lacks the long overhair, which has apparently been worn off. I also refer here two very young specimens from Costa Rica, formerly identified by me as *D. aurita*, on account of the yellow color of the ears, and also six adults from Costa Rica, collected by the late Dr. Gabb near San José.

Didelphis richmondi differs from *D. marsupialis* in the more slender form of the skull, which is long and narrow, with very long nasals, and in the great length of the tail. It also differs in

the dull greenish orange-buff color of the basal portion of the underfur; also in the very strongly defined median black stripe running over the top of the head from a point a little in front of the eyes to the occiput, and in the nape and shoulders being nearly black in contrast with the rest of the dorsal surface, the coarse overhair being almost wholly black on the anterior portion of the body and mainly whitish on the posterior. The amount of black at the base of the tail varies from about one third to two thirds of the total length of the tail. The ratio of tail length to the length of head and body averages, in the three adult specimens, 112, while the ratio of the length of the nasals to the basal length of the skull is 53.5.

In short, *D. richmondi* is much more closely related to the *D. karkinophaga* group than to *D. marsupialis*, sharing with the members of the *karkinophaga* group the dingy orange-buff color at the base of the underfur. In general features *D. richmondi* most closely resembles *D. k. caucae* from the upper Cauca Valley of western Colombia, but differs from this form in its much larger size and slenderer form, the relative length of the nasals and tail in *D. caucae* being nearly the same as in *D. marsupialis*.

NOTE ON *Didelphis pernigra*.

In this connection it may be added that the distinctness of *D. pernigra* from all other forms of *Didelphis* is emphasized by this further study of the group, its distinctive features being, as already stated, its small size, very long tail, peculiar coloration and pelage. The black overhair of the pelage in *D. pernigra* is less stiffened than in the other forms of *Didelphis* and hardly corresponds in coarseness and harshness to the overhair in the other forms of the genus. To emphasize its differences in size and proportions, a table of measurements (see Table VI) and also illustrations (Pl. XXIV, Figs. 1-1a) are added for comparison with the other forms.

It has also become evident that dichromatism prevails in the various forms of the *D. karkinophaga* group, at least so far as those of northern South America are concerned, though not before recognized. It occurs in the Trinidad form, provisionally taken to represent *D. karkinophaga*, in the absence of satisfactory material from Guiana; it occurs also in *D. k. colombica*,

where, however, the black form prevails; and also in *D. k. cauca*, where the two phases are about equally represented. It has heretofore been very difficult to account, for example, for the occurrence of black and gray specimens among the very young specimens as well as among the adults, but from this point of view the matter becomes very simple. The type of *D. cauca*, it may be added, is a specimen in the gray phase, while the type of *D. colombica* is a worn specimen in the black phase.

EXPLANATION OF THE TABLES OF MEASUREMENTS, ETC.

All the measurements are in millimetres. In measuring skulls the total length is taken from the front border of the premaxillaries to the posterior border of the occipital crest. In young animals, which have just acquired m^4 , this is often less than the basal length, but in animals more advanced in age, and especially in very old individuals, it exceeds by about 10% the basal length. Basal length, in the present paper, is the basal length of Hensel, and is taken from the inner base of the upper incisors to the front border of the foramen magnum. The other skull measurements require no special explanation.

In all skulls of which measurements are tabulated the fourth molar has reached its full development. In the 'sex and age' column ad. y. = young adult; ad. m. = middle-aged adult; and ad. o. = very old adult.

The external measurements are in every case those taken by the collector from the fresh specimen. In most cases only three measurements appear to have been taken, namely, the total length, the length of the tail, and the length of the tarsus. For purposes of comparison, and in the computing of ratios, it has been found convenient to separate the length of the head and body, which is found by subtracting the tail length from the total length.

The source of the material used is indicated by prefixing to the numbers the letter A to distinguish the specimens from the American Museum of Natural History. All those not thus distinguished are from the Biological Survey Collection in the United States National Museum, Washington, D. C.

In the case of fractional numbers, the number above the line refers to the skull and the number below the line to the skin.

POSTSCRIPT

Since this paper was put in type I have received through the kindness of Dr. C. Hart Merriam, Chief of the Biological Survey of the United States Department of Agriculture, five specimens of *Didelphis* collected by Messrs. E. W. Nelson and E. A. Goldman, at Chichenitza, Yucatan, and Apozote, Campeche, during January and February, 1901. These specimens, with others from Merida, Yucatan, indicate a form distinctly separable from any heretofore recognized. It may be characterized as follows :

***Didelphis yucatanensis*, sp. nov.**

Type, No. 100299, Biol. Surv. Coll., U. S. Nat. Mus., ♂ adult, Chichenitza, Yucatan, Jan. 29, 1901; E. W. Nelson and E. A. Goldman.

Nearest in size and external features to *D. caucæ*, but much smaller. Coloration and character of pelage not especially distinctive. Dichromatic, both the black, and the gray phase being about equally represented. Nose and nails flesh color; ears, feet, and basal half to three-fourths of tail black. Size, very small, intermediate between that of *D. caucæ* and *D. pernigra*, and hence a pigmy in comparison with *D. richmondi* and the various members of the *D. marsupialis* group, which widely separate it geographically from *D. caucæ*, which latter is also much larger than *D. yucatanensis*.

External Measurements.

Nat. Mus. No.	Locality.	Sex.	Total length.	Head and body.	Tail.	Tarsus.	Tail ratio.
108296	Apazote, Campeche..	♂ juv.	685	373	312	58	83
108297	" " "	♂ juv.	634	312	322	54	103
108298	Chichenitza, Yucatan.	♂ ad.	756	363	393	60	108
108299	" "	♂ ad.	680	364	316	60	87
108300	" "	♀ ad.	697	327	370	55	113

Measurements of Skulls.

Nat. Mus. No.	Sex.	Total length.	Basal length.	Nasals, length.	Zygom. breadth.	Mastoid breadth.	Palatal length.	Tooth-row.	Molar series.
108298 ¹	♂	100	90	46	48	29.4	52	34	19
108299 ¹	♂	99.5	89.5	42	51.6	30	55	34.6	19
108300 ¹	♀	88	81.5	40	42	26	52.5	33	19.3
13476 ²	♂ ad.	106	95	46.5	56	31	54	36	20
87988 ²	♂ ad.	104.6	—	46	57.6	32.3	55	32	18
11423 ²	♂ ad.	103.3	—	46.3	53	30	55.6	34	19

¹ Chichenitza, Yucatan.² Merida, Yucatan.

This species is based on three specimens from Chichenitza, Yucatan (the type locality), four from Merida, Yucatan, two from Apazote, Campeche, and one labeled simply "Campeche." All are fully adult, with the crests of the skull highly developed and the teeth more or less worn, except the Apazote specimens, in which m^4 is in sight but not fully grown. Of these ten specimens five are in the gray phase and five in the black phase of coloration. The skins give the impression of a small, slender, delicately formed animal, a feature well borne out by the skulls.

Didelphis yucatanensis appears to be a very distinct form, characterized especially by its small size, as compared with *D. tabascensis*, found in the adjoining portions of Mexico and in Guatemala, and *D. richmondi* of Nicaragua, by which it is geographically isolated from the small forms occurring in western Colombia and Peru. It differs in the form of the nasals from true *D. marsupialis*, which are pointed posteriorly instead of being bluntly obtuse or more or less truncated on the posterior border. In other words, they are of the usual or normal form for the genus, as seen in *D. virginiana*, *D. richmondi*, and *D. tabascensis*, etc.

I.—DIDELPHIS VIRGINIANA.

Mus. No.	LOCALITY.	Sex and age.	Total length.	NASALS.			Zyg. br'dth.	Postorb. proc.	Postorb. constrict.	Mastoid br'dth.	Br'dth at canines.	PALATE.			EXTERNAL MEASUREMENTS.			RATIOS.										
				Basal length.	Length.	Gr. br'dth.						Least br'dth.	Length.	Br'dth at m.	Br'dth inside.	Toothrow.	Molar series.	Total length.	Head and body.	Tail.	Tarsus.	Nasals to basal length.	Palate to basal length.	Zyg. br'dth to basal length.				
A2671	Elizabeth, N. J.	♂ ad. y.	113	101	53	18	5.3	63.5	26	12	35	21	62	35	21	38.5	21	—	—	—	—	—	—	—	52	51	62.9	
A316	Miller's Place, N. Y.	♂ ad. m.	128	115	62	22	7.5	72	29	11.5	37	24	68	35	21.5	40	21	—	—	—	—	—	—	—	54	59	62.6	
A2655	Long Island, "	♂ ad. m.	114	104	53	17	5.4	62.5	25	12	33	20	63	34	22	39.5	22	—	—	—	—	—	—	—	51	65	60	
56599	Montauk Point, "	♂ ad. m.	114	104	54	17	5.5	56.5	23.7	11.3	32	18	63	34	21	39	21.5	730	475	255	65	52	65.8	54.3				
A317	Miller's Place, "	♂ ad. y.	105	94	51	18	5.3	56	22	11	31	18	58	34	20	38.5	22	—	—	—	—	—	—	—	54	62	59.5	
A1668	Schoharie, "	♂ ad. m.	118	105	56	21.5	—	—	26	11.5	34.6	21.7	65	34	21.5	—	—	—	—	—	—	—	—	—	51	62	59.5	
A1664	Fort Montgomery, N. Y.	♂ ad. m.	115	104	54	19	6	60	24.3	11	33.4	20	65	34	19.5	41.6	23	—	—	—	—	—	—	—	52	62.5	57.7	
A1175	Carrettsville, O.	♂ ad. y.	115	106	56	22	7	65	27.4	11	35	20	64	34	20	40	22	—	—	—	—	—	—	—	51	60	61.3	
A1176	"	♂ ad. m.	118	110	58	19	6	63.5	24.5	11	36	21	65	35	20	41	23	—	—	—	—	—	—	—	52	60	57.8	
A1173	"	♂ ad. m.	118	109	54	17	6	62	24	12	37	20	67	36.5	24	42	21	—	—	—	—	—	—	—	50	61	57	
A1172	Golden City, Mo.	♂ ad. m.	105	96	48	17.5	5.5	57	24	11.6	32.5	18	61	32	19	38	20.7	774	469	305	69	61	44.4	56.5	50	61	57	
A1171	Harshorne, I. T.	♂ ad. m.	118	108	50	16	5.4	56.3	24	13	32	17.5	60	34	20	39.5	21.3	750	435	315	65	73	52	62.4	50	61	57	
A16594	Hatteras, N. C.	♂ ad. m.	131	116	60	20	6	69	27.5	11	39.5	23	70	37	24	41	23	871	518	353	65	64	52.6	60.3	59.5	—	—	
A16595	"	♂ ad. m.	124	—	56	22	7	70	29	11	38	22	67.5	33	23	40	21	640	370	270	65	73	—	—	—	—	—	
A16596	Riceboro, Ga.	♂ ad. o.	117	100	51	18.5	5	57	25	13	33	18	61	33	20.5	40	22	747	437	310	66	70	51	57	—	—	—	
40695	Danville, Tenn.	♂ ad. o.	122.5	111	56	20.5	5	69	28	11.5	34.3	22.3	65	35	21	39	22	785	405	320	52	71	50.4	58.6	62.7	57.8	—	
47728	Clarkville, Tenn.	♂ ad. m.	111	102	51	18	5.5	59	25	12	34	20	64	35	22	40	21	730	440	310	60	70	50	62.7	57.8	—	—	
47729	Big Sandy, "	♂ ad. m.	106	99	49	17	5.7	57	23	12	33	19	60	34	20.5	38	21	740	430	310	66	72	49.4	61.6	57.5	—	—	
A16596	San Antonio, Texas.	♂ ad. m.	120	113.5	55	20	7.5	66	26	13	36.6	24	64	33	19	38	21.3	—	—	—	—	—	—	—	48.4	56.3	66.6	
A16597	"	♂ ad. m.	129	118	60	21	7	66	30	12	38	23.7	71	32	20	42.5	22	864	472	394	75	71	50.8	60	56	56	—	
A16598	"	♂ ad. m.	125	114	59	22.3	6	63	30	12	38	24	70	36	21	41	22	787	482	395	70	70	52	61.4	55.2	—	—	
A16599	"	♂ ad. m.	118.5	100	50	17	6	55	22	11.5	33.3	20	61	33	22	39	21	—	—	—	—	—	—	—	50	61	55	—
A4627	"	♂ ad. m.	117.5	103.6	54	18	6	62	24	11	35	20	63	33	19.5	34.5	21	—	—	—	—	—	—	—	52	60.8	59.8	—
A7624	"	♂ ad. m.	119	109	56	22	8	61.6	28	12	34	20	67	34	19	39.5	22	—	—	—	—	—	—	—	51.4	61.5	56.5	—
A8804	Virginia Point, Galveston Co., Texas.	♂ ad. m.	131	119	59	20	8	65	26	11	36	26	70	35	21	40	22	830	480	350	80	73	50	59	54.6	—	—	

I.—DIDELPHIS VIRGINIANA (concluded).

Mus. No.	LOCALITY.	Sex and age.	Total length.	Basal length.	NASALS.		Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	PALATE.		EXTERNAL MEASURE- MENTS.				RATIOS.							
					Length.	Gr. br'dth.	Least br'dth.					Length.	Br'dth at m. ⁴ , outside. Br'dth at m. ⁵ , inside.	Upper tooth-row.	Molar series.	Total length.	Head and body.	Tail.	Tarsus.	Ear.	Tail to head and body.	Nasals to basal length.	Palate to basa- l length.	Zyg. br'dth to basal length.	
44961	Dickinson Bay, Galveston Co., Texas.....	♂ ad. m.	116	105.5	55	20	6	19	28	11.4	35	24.5	66	—	40.5	21	820	500	320	62	—	64	52	62.5	57.9
60557	Vernon, Wilbarger Co., Tex....	♀ ad. m.	128	116.5	58	22	7.7	72	29	11	39.2	54	68	35	32	23	—	—	—	—	—	—	50	58.4	61.8
44833	Velasco, Brazoria Co., ".....	♂ ad. o.	116	105	52	16.5	5	58	22	12	34	19	65	37	20	—	—	—	—	—	—	—	40.4	62	55.2
44834	Deming Station, Tex., ".....	♂ ad. y.	112	103	52	17	6	60	24	11	34	21	61	34	—	21	770	470	300	66	64	50.5	59.2	58.2	
44835	" " " " " " " " " "	♂ ad. y.	111	103	50	18.6	6.5	59	23	11	33	20.7	61	33	20	39.5	450	320	76	71	48.5	59.2	57.2	56.6	
44836	" " " " " " " " " "	♂ ad. m.	109	96	50	18	6	55.5	21.4	12	32.5	18	69	33	19	38.3	321	770	468	70	65	51	61.2	56.6	

II.—DIDELPHIS VIRGINIANA PIGRA.

[illegible]

III.—DIDELPHIS MARSUPIALS.

Mus. No.	LOCALITY.	Sex and age.	Total length.	Basal length.	NASALS.			Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	PALATE.			Upper tooth-row.	Molar series.	EXTERNAL MEASUREMENTS.			RATIOS.					
					Length.	Gr. br'dth.	Least br'dth.					Length.	Br'dth at m. ⁴ outside.	Br'dth at m. ⁴ inside.			Head and body.	Tail.	Tarsus.	Tail to head and body.	Nasals to basal length.	Palate to basal length.	Zyg. br'dth to basal length.		
88240	Hermosilla, Sonora, Mex.	♂ ad. o.	121	108	51	17	7.65	25	10	36	20	65	13	20	35.5	21	912	407	415	76	84	47.2	60.2	51	
88241	Monterey, Nuevo Leon, Mex.	♂ ad. m.	116	111.5	51	17	7.59	26	10.5	34	20	62.5	32.5	19	36	20	816	426	390	70	91	45.8	56	53	
88242	"	♂ ad. m.	103	95	45	20	5.6	24	12	32	18	59	31	20	35	19	645	349	296	56	84	47.4	62	52.7	
94692	Altamira, Tamaulipas,	♂ ad. o.	116	104	49	17	6.60	24	11.5	34	22.5	63	33.6	—	37	20	842	442	360	70	81	47	60.6	57.7	
92903	"	♂ ad. m.	108	99	47	14	6.5	22	11.5	32.5	20	59	31	19	34	20	885	448	437	70	98	46	59.6	52.5	
92904	"	♂ ad. m.	100	94	44	13	5.48	22	12	30	17.8	59.5	30.7	18	37	20.7	756	411	345	66	84	47	63.3	48	
95962	"	♂ ad. o.	108	100	47	15	5	27	11	32	20	62	31	18.4	37	21	—	—	—	—	—	47	62	50	
96088	San Juan Capistrano, Zacatecas, Mex.	♂ ad. m.	107.5	96	47.5	14	6	52	22	10	31	58	26	16.5	34	19	805	403	402	65	100	49	60.4	54	
76820	Culiacan, Sinaloa, Mex.	♂ ad. m.	118	105	53	18	7	59	26	10.5	37	21.5	64	31	18.5	36	19	849	427	412	60	96	50	61	56
91170	Rosario, "	♂ ad. o.	109	99	48	17	6.4	52	24.5	11	33	20.4	62	31	20	36.5	20	835	433	400	66	94	47.3	62.6	52.5
96821	Mazatlan, "	♂ ad. m.	105	94	46	14	5	40.6	21	10.5	32	18.5	54	30.4	20	36.5	20	840	435	405	65	93	49	57.4	51.7
96822	"	♂ ad. y.	92	83	41.5	11.5	4.5	44	21	11	28	15.5	53	28.5	17	34	19	830	—	—	—	50	50	64	53
98077	Escuinapa, "	♂ ad. o.	114	102	49	15	6.5	52.6	44	10	35	20	63	31	19	36	19.6	—	—	—	—	50	61.5	51.6	
96225	Sierra de Choix, Sinaloa, Mex.	♂ ad. y.	91.5	84.4	42	13	6	41.5	20	11	35	15.5	52.5	20	17.5	34	19.5	752	395	357	61	90	50	62.2	49.2
96810	Chacala, Durango, Mex.	♂ ad. m.	117	106	51	19	9	62	26	11	35	22	62	31	20	33	19	843	429	414	64	96	48	58.5	58.5
51506	Amecameca, Fed. Dist., Mex.	♂ ad. m.	115	107	51	17	6	60	25	11	38	21	65	31	18.5	37	20.5	850	455	395	76	87	47.3	60.8	56
33882	Pachuca, Hidalgo, Mex.	♂ ad. m.	98	90	44	12.6	6	50	21	10.5	31	16.5	58	31	18	36	20	805	435	370	63	85	49	64	55
52699	Real del Monte, Hidalgo, Mex.	♂ ad. m.	92	84	41	12.6	4.5	48	18	11.4	29	17	53	24	18	32	19.4	69	361	332	60	96	49	63	57
51865	Pachuca, Hidalgo, Mex.	♂ ad. m.	102	92.5	47	14	5	46.5	20	10	31.5	17	57	29	17.5	35	20	—	—	—	—	50	62	50	
99978	"	♂ ad. m.	96	90	44	14	5	47.5	20	10.7	30	16	55	28.5	17	36	20	—	—	—	—	50	61	52.7	
92978	Metlatoyuca, Puebla, Mex.	♂ ad. o.	124	111	54	17	6.5	60	27	11	36	22	68	33	21	40	21	855	460	395	73	86	48.7	61.5	54
55579	San Martin, "	♂ ad. m.	105	92.5	45	14.5	5	50	23	12	32	18	61	30.7	20	37.3	20	773	441	332	64	75	48.7	66	54
69954	Tuxtepec, Oaxaca, Mex.	♂ ad. m.	123	115	52	17.3	7	64	26	11	37	25	70	36	20	39	20	852	435	367	66	82	45.2	60.8	54
69955	"	♂ ad. o.	120	111	53	16.5	6	58	26	13	36	20	68	34	20	41	21	830	465	385	70	83	47.7	61.3	52
65542	"	♂ ad. m.	112	105	51	14	6.5	53.2	21	11.5	34	19.5	65	34	20	40.5	21	—	—	—	—	62	62	—	
73490	Tehuantepec	♂ ad. m.	131	118	56	18.5	7	67	30	12	41	23	71	33.5	21	40	22.1	930	484	446	80	92	47.5	60	—
73708	San Mateo del Mar, Oaxaca, Mex.	♂ ad. m.	113	106	52	16	6.5	59	24	9.6	33.6	20	58	32	19	35	20.5	—	—	—	—	—	—	—	
73491	Guichecovi, Oaxaca, Mex.	♂ ad. m.	113	106	52	16	6	50.5	25.3	12	34.3	19.5	66	34	19	31	20.5	853	483	370	70	76.5	49	62	50
73492	"	♂ ad. m.	106	96	42.5	16	6	50	23	12	32	21	60	31	39	21	—	—	—	—	—	—	—	—	
69708	Cutcatlan	♂ ad. m.	102	95	45	16	6	51	25	11.5	30.5	18.6	60	30	33	18.5	19.5	805	393	412	69	105	44.3	62.4	53
69799	"	♂ ad. m.	109	109	52	18	7.5	65	28.6	11	38	24	64	32.6	20	37	21	—	—	—	—	—	—	—	

1 Five molars.

III. — DIDELPHIS MARSUPIALIS (continued).

Mus. No.	LOCALITY.	Sex and age.	Total length.	Basal length.	NASALS.			Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	PALATE.			EXTERNAL MEASUREMENTS.			RATIOS.							
					Length.	Gr. br'dth.	Least br'dth.					Zyg. br'dth.	Br'dth at m. ⁴ .	Br'dth at m. ⁴ .	Inside.	Upper toothrow.	Molar series.	Total length.	Head and body.	Tail.	Tarsus.	Tail to head.	Nasals to basal length.	Palate to basal length.	Zyg. br'dth to basal length.
43200	Ameria, Colima, Mex.....	♂ ad. o.	127	114	52	20	8	67-5	30	12	38.5	26	67	34	21	37	20	855	430	416	79	95	45-6	59-2	
43201	"	♂ ad. o.	117	109	45	18	6	61-5	26	10	31	22.5	64	31	19	37	20	882	430	416	79	95	41-3	59-5	
43202	"	♂ ad. o.	117	108	48.5	16.5	7	58	24	10.5	35	22	67	32.5	20	37	21	882	430	416	71	90-5	45	66.5	
43203	"	♂ ad. o.	111	100	48.5	16.2	53	24	11	34.5	20	62	30.5	19	35	50.5	870	418	432	67	96	48.5	62	53-7	
43270	"	♂ ad. m.	109	101	50	14	5-3	38-5	20	11	35.5	20	63	31-3	19	30	—	—	—	—	—	—	47	60.4	54-4
43271	"	♂ ad. m.	106	96	48	16	6	53	24	10.5	34	19	59	30	17	37	20	—	—	—	—	—	47	62	57-6
43296	"	♂ ad. y.	105	95	46.5	15.5	5	57-3	25	11	32-3	19	58.5	31	18	36	20.3	—	—	—	—	—	47	61.4	55-2
43298	"	♂ ad. m.	105	95	46	15	5	54	22	11	31	18	58	32	18	36	20.3	—	—	—	—	—	40	61	60-3
43297	"	♂ ad. y.	102	94	45.6	15	5	54	22	11	31-3	17	57	30	17	35-4	20.5	—	—	—	—	—	48.8	61.6	56-8
43295	"	♂ ad. y.	102	94	45.6	15	5	54	22	11	31-3	17	57	30	17	35-4	20.5	—	—	—	—	—	48.5	60.6	54-6
43293	Manzanillo	♂ ad. m.	100	91.5	41.6	13.5	5	46	21.6	12	30	16.5	58	31	17	38	21.3	—	—	—	—	—	45	7.63	48-3
43292	"	♂ ad. o.	125	111	58.7	15	8	63	27	10	36	22	66	30	19	36.5	20	932	487	445	73	91	52-9	59-5	
43291	"	♂ ad. o.	122.5	108.5	53	17.6	7-6	65-5	27	10-5	38	24	66	33-5	19	36	20.2	690	425	365	56	87	48-8	60.8	60-4
43290	"	♂ ad. o.	117	—	43	14	6	52-5	22	11	32	19	60	30-6	18	36	20	780	405	375	62	92	48	60.8	60-4
43289	"	♂ ad. y.	100	91	44	16	7	52-5	22	11	32	18	56	33-5	—	—	—	792	412	380	67	92	48.3	61.5	58
43288	Atema Jac, Jalisco, Mex.....	♂ ad. o.	107	97	44	16.5	7	59-3	23	11-4	32	19.5	59	31	19.6	35-10	7	812	414	398	62	93	45.3	60.8	61
43287	"	♂ ad. o.	110	92	46	15	5	55	23	11	32	19	57	31-5	19	35	20	872	474	398	72	84	47	58-3	64
43286	Zapotlan, ".....	♂ ad. y.	110	92	40	18.5	5	50	22	11	30	17	55	31-5	19	35	20	788	367	361	66	98	47	58	60
88142	San Sebastian, ".....	♂ ad. o.	96	88.5	41	18.5	5	50	22	11	30	17	55	31-5	19	35	20	755	383	372	62	97	46.3	62.2	56.5
Ar665	Guadalupe, ".....	♂ ad. m.	93	85	40	18.5	5	47	21	11-5	30	15	58	30	17.5	34	19	718	348	376	60	106	47	64	55-3
Ar666	"	♂ ad. m.	92.5	89	41	14	5	47-3	21.5	11-3	29	16	56	29	19	30	20	—	—	—	—	—	46	64	53
Ar667	"	♂ ad. o.	98	91	39.5	14.3	5	46-7	21	11-3	30	18	56	30-5	19	35	19-7	—	—	—	—	—	45-5	62	56
Ar668	"	♂ ad. m.	100	93	41	15	6	48	21	11-6	31	16.5	52	30	18	35	20	—	—	—	—	—	44	62	53-5
Ar669	"	♂ ad. m.	95	86	42	14.5	6.5	50	22	11-5	30	18	54	29.5	18	33	5	—	—	—	—	—	44-2	56	51-6
Ar670	"	♂ ad. o.	97	88.5	40	15	6	51	22	11	31	16.5	56	31	18	34	19.5	—	—	—	—	—	47-2	60	51-6
Ar671	Querendaro, Michoacan, Mex.....	♂ ad. o.	115	105	43	15	7-3	33	24	11	34	20	63	32	20	37	20.7	550	440	401	67	87	45	61	57-6
Ar672	"	♂ ad. m.	102	93	45	16	5	52	22.5	11-2	33	17	57	31	18.5	36	20	750	385	365	63	94	48	61	56
Ar673	"	♂ ad. o.	104	94	45	16	6	52	23	12	33	17	57	30	19	36	20	755	473	342	65	83	48	61	56
76617	Acapulco, Guerrero, Mex.....	♂ ad. o.	122	110	54	20	8	62	30	12	36.5	24	66	31	20	37-5	20	910	508	402	73	80	49	60	56.4
76619	"	♂ ad. y.	105	95	46	16	6	50	23	11	32	18	62	30.5	18.5	36	20.3	804	435	369	66	85	48	61	53-7
76620	"	♂ ad. o.	108	100	46.5	16.3	7	51	24.6	10-7	32	18	60	30-5	19-3	35	20	839	439	400	64	84	49	61	52
58415	Orizaba, Vera Cruz, Mex.....	♂ ad. o.	130	114	56	20	8.5	67	25	10-4	38	24	68	34	23	37	19	845	387	458	70	82	40	60	59.6
58416	"	♂ ad. m.	111	97.5	46	15	6	53	23	10	33	19	59	31	20	37	20.5	—	—	—	—	—	47	61	53
58417	"	♂ ad. y.	107	98	47	16.4	6	53	25	12	34	20	61	33	20	37-5	21	830	338	402	67	69	48	61	57-5
58418	"	♂ ad. o.	110	99	48	16	7	56	28	12	33	20	61	34	21	37	20.5	880	405	335	78	76	45	60	54
59399	Jico, Minitlan, ".....	♂ ad. o.	136	128	58	19	8	60	28	10-5	42	28	76	34.5	22	39	20.5	940	405	335	78	76	45	60	54
76123	"	♂ ad. o.	122	113	52	16	7	62	25	11-3	35	22	69	—	—	—	—	889	364	351	78	70	46	67	50-8

IV.—D. MARSUPIALIS TEXENSIS.

Mus. No.	LOCALITY.	Sex and age.	Total length.	Basal length.	NASALS.			Zyg. breadth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	PALATE.			EXTERNAL MEASUREMENTS.				RATIOS.					
					Length.	Gr. br'dth.	Least br'dth.						Length.	Br'dth at m. $\frac{1}{4}$.	Br'dth at m. $\frac{1}{2}$.	Br'dth at m. $\frac{3}{4}$.	Upper tooth-row.	Molar series.	Total length.	Head and body.	Tail.	Tarsus.	Tail to head and body.	Nasals to basal length.	Palate to basal length.
4127	Brownsville, Tex.	♂ ad. m.	121	110	52	18.5	9	57	27	11.4	36.5	21	64	32	20.5	37	20	820	410	410	70	100	46	58	51.8
4128	"	♂ ad. y.	111	100	52	16	6.7	59	25	11.6	35.3	20	60	30	18.5	35	19.3	810	460	350	68	80	52	60	59
4129	"	♂ ad. y.	95	87	41.5	15	5	46	27.7	10	29	17.3	30	19	35	20	700	380	320	60	84	48	60.9	53	
4130	"	♂ ad. y.	99	89	43	14.7	6	46	21	10	28.3	16	29	18	35	20	800	400	400	60	100	48	63	51.7	
4131	Matagorda,	♂ ad. y.	96	90	42	15	5	47	23.4	11.3	30.5	17.5	34	30	18	33.5	20.6	710	360	350	60	97	46.6	60	52.2
4132	"	♂ ad. m.	116	107	50	19	7	60.5	12	35	20	66	35	21	38	21.6	820	505	315	66	62	46.7	61.7	56.5	
4133	"	♂ ad. o.	120	109	54	20	6	70	27	12	34.5	23.5	35	21	37	20.6	—	—	—	—	—	—	49.5	50.6	64.2
4134	Port Lavaca	♂ ad. m.	128	117.5	57	21	6.5	68.3	27.6	11	38	24	70.5	35.5	20.5	40.5	23	—	—	—	—	—	48.5	60	58
99708	Sycamore Creek, Tex.	♂ ad. y.	112	103	57	17	6	52	26.7	11.3	31.5	19	62	31	19	38	20.6	730	370	360	71	97	55	60.1	50.4
23223	Del Rio, Val Verde Co., Tex.	♂ ad. m.	108	96	48	17	6	54	24.5	11	32	20	58	32	20	36	20	800	430	370	64	85	49	60.2	50.8
99709	Corpus Christi, Tex.	♂ ad. m.	109	98	48	16	6.5	58	26	10	33	20	59	31	19	36	20	800	430	370	64	86	52.6	62	50.8
43805	"	♂ ad. m.	104	97	50	17	7	54	25.3	10.5	34	20	59	31	19	36	20.5	730	475	255	65	56	51.5	60.8	55.6
43806	"	♂ ad. m.	107	97	50	17	7	54	23	12.5	31	19	59	32.5	20	36.5	21	820	460	360	73	80	50	63	57
43807	"	♂ ad. y.	111	98	49	17	6	56	26	11	33	21	61.7	32.5	20	36.5	21	—	—	—	—	—	—	—	—
43808	"	♂ ad. o.	103	92	45	16	7	50	12	29.5	18	58	30.5	19	33.5	20	698	418	280	58	69	49	63	54	

Didelphis m. texensis

V.—*DIDELPHIS MARSUPIALIS TABASCENSIS* AND *D. RICHMONDI*.

Mus. No.	LOCALITY.	Sex and age.	Total length.	Basal length.	NASALS.			Zyg. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	Br'dth at canines.	PALATE.			EXTERNAL MEASUREMENTS.			RATIOS.						
					Length.	Gr. br'dth.	Least br'dth.						Length.	Br'dth at m ⁴ .	Br'dth at m ³ .	Head and body.	Tail.	Tarsus.	Tail to head and body.	Nasals to basal length.	Palate to basal length.	Zyg. br'dth to basal length.			
100510	Teapa, Tabasco, Mex.	♂ ad. o.	122	111	58	17	6.3	62.5	25	12	35	25	99	32.5	21	37	20	919	456	463	71.5	102	52.3	60	56.3
100511	"	♂ ad. m.	119	108	55	15	6	61	23	11.5	33	21.5	65	31	20	36.5	20	914	465	449	60.5	97	51	60.2	56.5
100512	"	♂ ad. m.	115	105	53	15.5	7	60	24	11.3	34	20.5	64	32	19	37	20	902	460	442	60	96	51	61.2	54.3
100509	"	♂ ad. m.	108	99.5	49	16	6.2	54	26	12	31.5	19	61	33.4	20	37	20	783	398	385	65	97	50	61.2	54.3
100513	"	♂ ad. o.	103	94	49	13	6	47	20	11	29	16.5	60	29	—	36	—	835	421	414	66.5	98	52	61.7	50.4
100507	Frontera, "	♂ ad. m.	116	103	55	15	6	57	23	10	33	15	61	29	17.5	35	61.9	836	429	417	62.5	97	53.4	59.2	55.3
100508	"	♂ ad. m.	96.5	88	43	13.6	5.7	48	24	11.5	32	17	55	30	10	36	20	763	362	401	61	110	49	60.2	54.5
58687	Mirador, Vera Cruz, Mex.	♂ ad. m.	108	98	53	15	6	58	24	11.3	32	20	61	31	20	36.5	20	879	420	439	70	107	54	62.3	59
58688	"	♂ ad. m.	101	94	48	16	6	57	26	12	31	18.3	59	29	19	36	20	823	388	430	61	112	51	62.7	60.6
56890	"	♂ ad. y.	104	94	48	16	6	57	23	12	31	18	62	32	—	39	20	825	410	415	65	104	—	—	—
65543	Catemaco, "	♂ ad. y.	109	100	53	15	5.5	49	23	12	32	18	62	32	—	39	20	886	455	431	64	95	52	62.5	50
65540	"	♂ ad. y.	105	96	50	19	5	50	23	12	31.5	18	60	30	20	37	20	856	488	388	72	75	50.5	60.5	53
65957	"	♂ ad. o.	121	109	55	18	6	58	25	10	34	22	66	32	21	40	—	866	488	398	72	75	50.5	60.5	53
65956	Papantla, "	♂ ad. m.	101	92	46	15	6	49	22	12	34	22	66	32	21	40	—	811	415	396	60	95	50	64	53.3
93043	"	♂ ad. y.	90	82	45	11.5	5	45	18.3	10.5	26	15.6	53	27	17	33	18.4	684	349	335	57	96	54.9	54.9	54.9
76207	Tuxtla, Chiapas, Mex.	♂ ad. m.	91.6	87.46	14.6	5	47	21	28.3	16.5	56.5	30	19.5	36	20	783	417	366	59	86.5	52	64.3	51.3	—	—
76211	Tumbala, Chiapas, Mex.	♂ ad. y.	122	101	55	16.5	6.3	59	26	12	36	22	66	34	21	37.5	21	830	448	382	68	88	55	65	58.4
76213	"	♂ ad. o.	139	125	59	22	8	68	32	11.3	42	25	67.5	34	21	41	22	930	494	436	75	88	47	61	54.5
76212	"	♂ ad. o.	114	104	52	15	6	56	22	13.3	34	20	63	34	21	35	20	794	444	350	68	80	50	61	53.8
76209	San Cristobal, Chiapas, Mex.	♂ ad. m.	98.3	91	43	14	4.5	50	24	12	31.5	17	58	32	19	36	20	725	407	318	58	79	50	63.7	50.5
76202	Ocozacoatlán, "	♂ ad. m.	99.5	91	45	13	5	50	21	12	31.5	17	58	32	19	36	20	760	418	362	67	87	50	64	55
76203	Ocuilapa, "	♂ ad. m.	116.5	105	54	17	6	58	28	11	34	20.5	66	31	20	38	—	845	501	344	73	88	51.7	63	55
77688	Huehuetan, "	♂ ad. o.	134.5	122.5	63	20	7.5	68	27	12.5	41.7	24.7	74.5	34.5	—	44	25	1017	581	436	—	74	51.3	60.8	55.5
77687	"	♂ ad. m.	120	111	51	16	7	53	25	11.8	33.3	20	61	30.7	19.3	38	20.6	—	—	—	—	—	—	—	—
77997	"	♂ ad. o.	122	109.5	60	16.5	6	57	25.5	11.7	34.5	21	67	31	19	37	15	—	—	—	—	—	—	—	—
77997	Greytown, Nicaragua.	♂ ad. m.	114	104	54	15	7	55	25	11.5	32.5	18	62	30	19	38	20	948	471	477	70	100	52	62.5	52.6
77997	"	♂ ad. o.	106	96	52	17	6.5	52	22	11	30.3	18	65	31	19	37	15	874	394	404	65	122	54.2	64.5	54
77997	"	♂ ad. y.	102.5	92	50	13.3	5	47	23	11	28	17	60.5	30.7	19	38.6	16.7	853	400	453	65.5	113	54.3	64.7	51

1 Five molars.

*D. marsupialis tabascensis.**D. rich-*

EXPLANATION OF THE PLATES.

PLATE XXII.

VARIATION DUE TO AGE IN DIDELPHIS VIRGINIANA.

Figures all $\frac{1}{2}$ nat. size.

Fig. 1.—No. 48598, U. S. Nat. Mus., ♀, Cedar Vale, Kan. Side view.

Fig. 1a.—Same specimen from side.

Fig. 1b.—Same specimen, from below. Milk premolar and m^1 in place.

Fig. 2.—No. 47498, U. S. Nat. Mus., ♀, Cedar Vale, Kan. Side view.

Fig. 2a.—Same specimen, from below. Milk premolar and m^1 and m^2 in place.

Fig. 3.—No. 49364, U. S. Nat. Mus., ♂, Brazos, Texas. Side view.

Fig. 3a.—Same specimen, from below. The milk premolar has been shed and p^4 is just appearing; m^{1-2} in place, the latter about half grown.

Fig. 4.—No. 79117, U. S. Nat. Mus., ♂, Sebastian, Florida. From side.

Fig. 4a.—Same specimen from below. Permanent p^4 and m^2 nearly full grown; m^4 not yet developed.

Fig. 5.—No. 45401, U. S. Nat. Mus., ♂, Bay St. Louis, Miss. From side.

Fig. 5a.—Same specimen from side. Fully adult, but teeth very little worn.

This specimen is of further interest on account of the double canine on the left side.

PLATE XXIII.

DIDELPHIS MARSUPIALIS, D. M. TABASCENSIS, AND D. VIRGINIANA.

All figures $\frac{1}{2}$ nat. size, except figs. 6 and 7, which are natural size.

Fig. 1.—*Didelphis marsupialis tabascensis*, ♀ ad., No. 100509, U. S. Nat. Mus., Teapa, Tabasco, Mexico.

Fig. 2.—*Didelphis marsupialis tabascensis*, ♂ ad., No. 100513, U. S. Nat. Mus., Teapa, Tabasco, Mexico. Figures 1 and 2 illustrate individual variation in the form of the posterior border of the nasals.

Fig. 3.—*Didelphis marsupialis*, ♂ ad., No. 45274, Colima, Colima, Mexico, showing the usual or normal form of the nasals in *D. marsupialis*, for comparison with Fig. 2, which illustrates the normal form of the nasals in *D. m. tabascensis*, and Fig. 4, which shows the normal form of the nasals in *D. virginiana*.

Fig. 4.—*Didelphis virginiana*, ♂ ad., No. 316, Miller's Place, Long Island, N. Y., illustrating a normal old male skull, for comparison with the other forms of the genus.

Fig. 5.—*Didelphis marsupialis*, ♂ ad., No. 73492, U. S. Nat. Mus., Tehuantepec, Oaxaca, Mexico. To show the pair of supernumerary molars (m^5).

Fig. 6.—*Didelphis marsupialis tabascensis*, ♂ ad., No. 77688, U. S. Nat. Mus., Huehuetan, Chiapas, Mexico. To show supernumerary m^5 on left side.

PLATE XXIV.

DIDELPHIS PERNIGRA, D. MARSUPIALIS TABASCENSIS, AND D.
RICHMONDI.

All figures $\frac{1}{2}$ nat. size.

Figs. 1-1a.—*Didelphis pernigra*, ♀ ad., No. 16071, Am. Mus., Inca Mines, Peru. Type of the species.

Figs. 2-2a.—*Didelphis marsupialis tabascensis*, ♀ ad., No. 5 8687, U. S. Nat. Mus., Mirador, Vera Cruz.

Figs. 3-3a.—*Didelphis richmondi*, ♀ ad., No. 45140, U. S. Nat. Mus., Greytown, Nicaragua.

PLATE XXV.

YOUNG OF DIDELPHIS VIRGINIANA AND D. MARSUPIALIS, TWO
STAGES.

Figures $\frac{1}{2}$ nat. size.

Fig. 1.—*Didelphis marsupialis*, very young. No. 34502, U. S. Nat. Mus., Etzaplán, Jalisco, Mex. Comparable with Fig. 3, *D. virginiana*.

Fig. 2.—*Didelphis marsupialis*, somewhat older than the specimen illustrated in Fig. 1, and comparable with Fig. 4. No. 34560, U. S. Nat. Mus., Tulancingo, Hidalgo, Mex.

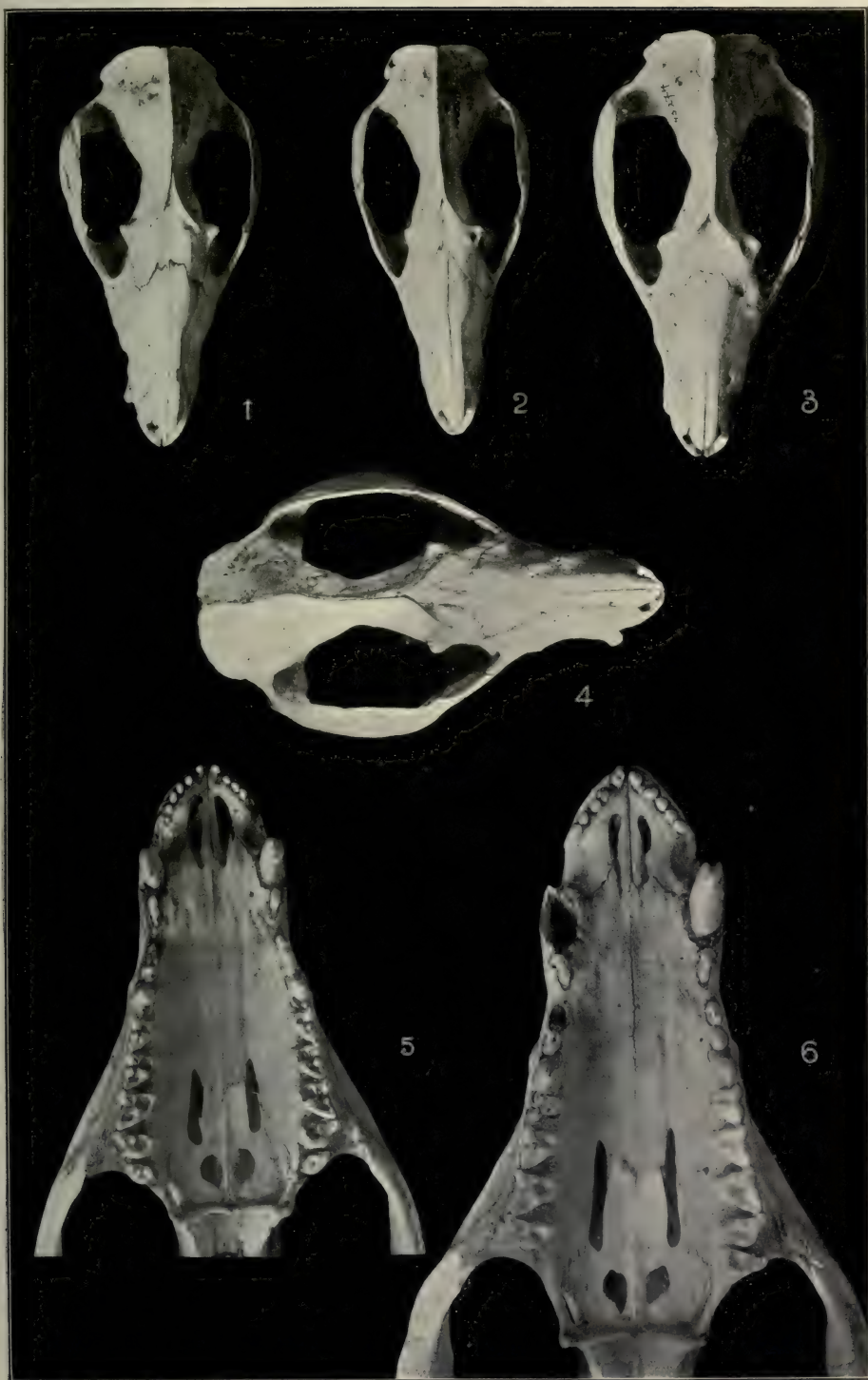
Fig. 3.—*Didelphis virginiana*, very young, corresponding in age to the specimen illustrated in Fig. 1. No. 36142, U. S. Nat. Mus., Hartshorne, Ind. Ter.

Fig. 4.—*Didelphis virginiana*, somewhat older than the specimen shown in Fig. 3, and comparable with Fig. 2. No. 34560, U. S. Nat. Mus., Marble Cave, Mo.



STAGES OF GROWTH IN DIDELPHIS VIRGINIANA.





1, 2, 6, *Didelphis marsupialis tabascensis*; 3 and 5, *D. marsupialis*; 4, *D. virginiana*.
Figs. 5 and 6 show supernumerary molars.





1-1a, *Didelphis pernigra*; 2-2a, *D. marsupialis tabascensis*; 3-3a, *D. richmondi*.





1 and 2, *Didelphis marsupialis*; 3 and 4 *D. virginiana*,



(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75; pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per
volume, which relate about equally to Geology, Palæontology, Mammalogy,
Ornithology, Entomology, and (in the recent volumes) Anthropology, except
Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens
in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.	Price, \$5.00	Volume VIII, 1896.	Price, \$4.00
" II, 1887-90.	4.75	" IX, 1897.	4.75
" III, 1890-91.	4.00	" X, 1898.	4.75
" IV, 1892.	4.00	" XI, Part I, 1898.	1.25
" V, 1893.	4.00	" " II, 1899.	2.00
" VI, 1894.	4.00	" XII, 1899.	4.00
" VII, 1895.	4.00	" XIII, 1900.	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum
of Natural History, issued monthly, from October to May, inclusive,—eight
numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May 1899. Price \$2.00.

(Continued on 3d page of cover.)

*Descriptions of Two New Opossums of the
Genus Metachirus.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XIV, ARTICLE XV, pp. 213-218.

New York, July 3, 1901.

The Knickerbocker Press, New York

Article XV.—DESCRIPTIONS OF TWO NEW OPOSSUMS OF THE GENUS METACHIRUS.

By J. A. ALLEN.

The Opossums of the genus *Metachirus* of Mexico and Central America had been referred to *D. quica* of Temminck, the type locality of which is the coast region of southeastern Brazil (*cf.* Allen, this Bulletin, XIII, 1900, p. 195), until in October of last year I separated the Central American form as *Metachirus fuscogriseus* (*l. c.*, p. 194), on the basis of a specimen supposed to have come from Colon. Through the kindness of Dr. C. Hart Merriam, Chief of the Biological Survey, U. S. Department of Agriculture, I have recently had opportunity to examine large series of specimens from Nicaragua and various localities in Mexico, numbering altogether 42 specimens. As probably no large series of examples of the genus *Metachirus* has ever before been brought together, it seems desirable to give a somewhat detailed account of this important collection.

***Metachirus fuscogriseus* Allen.**

Metachirus fuscogriseus ALLEN, Bull. Am. Mus. Nat. Hist., XIII, 1900, p. 194.

A number of specimens from Greytown and Bluefields, Nicaragua, agree well with the type of this species, supposed to have come from a point somewhat further south on the coast. There is, therefore, little to add to the original description of the species beyond noting the variations in the specimens of the present series due to age, season, etc.

The present material consists of 4 specimens, two adult males and two adult females, collected at Greytown, Feb. 7-10, 1892, by Dr. C. W. Richmond, now Assistant Curator of Birds at the U. S. National Museum; and 3 adults, 3 young adults, and 5 half-grown young, collected 50 miles above Bluefields on the Escondido River at various dates from May to November of the same year, also by Dr. Richmond, making in all 15 specimens from these two localities.

Three of the Greytown specimens are quite uniform in coloration, while the fourth is of a duller, browner black above and more strongly buffy below. The Bluefields adult and young

adult specimens are similar in coloration to those from Greytown, except in the case of one very old male, distinguished by its large size and a strong orange-rufous tinge on the cheeks, sides of the neck, and throat. This series shows, as in the case of *Didelphis*, that the animal increases greatly in size after reaching maturity. In the younger specimens the buff color of the ventral surface is restricted to the chest and the lower abdominal region, the two areas being connected by a narrow buffy median band, the sides of the abdomen being more or less plumbeous, with the tips of the hairs lighter, a condition often seen in various species of Muridæ, especially in *Neotoma*, *Oryzomys* and allied genera. The adult males are distinguished in the breeding season by a pale yellowish patch on the sides of the lower abdomen just in front of the thighs, the corresponding area in the female being whitish, and the hair at these points is of a little different texture from that of the surrounding parts.

EXTERNAL MEASUREMENTS.

Nat. Mus. No.	LOCALITY.	Sex.	Total length.	Head and body.	Tail.	Tarsus.	Tail ratio.
	Greytown, Nicaragua.....	♂	586	282	304	45	108
	" ".....	♂	530	257	273	40	107
	" ".....	♂	529	261	268	41.5	103
	" ".....	♂	519	245	274	40	112
	Near Bluefields, ¹ Nicaragua.....	♂	625	305	320	46	105
50877	" ".....	♂	562	265	297	41	113
51380	" ".....	♂	518	243	275	41	113
	Average, 3 males.....		580	281	299	44	106
	4 females.....		532	254	279	41	109.8

¹ Fifty miles from Bluefields, on the Escondido River.

MEASUREMENTS OF SKULLS.

Mus. No.	LOCALITY.	Sex.	Total length.	Basal length.	Nasals.			Zyg. breadth.	Postorb. proc.	Postorb. constr.	Mastoid breadth.	Palate.		Upper toothrow.	Molar series.
					Length.	Gr. breadth.	Least br'dth.					Length.	Br'dth at m ⁴ outside.		
4444	Greytown, Nicaragua	♂	77.3	65	34.6	9	5	38.5	14.3	9	23	40	21.4	26	14
4444	" "	♂	66	61	32.3	8	4	34.5	14.5	8	21.5	30	20	25	14
50887	Bluefields, "	♂	66	60	33.5	6	5	33	12	8	18.5	38	20	25.3	13.6
51442	" "	♂	79	70	36	9	5.6	40.5	15	8.3	24	43	22	25	14

Metachirus fuscogriseus pallidus, subsp. nov.

Type, No. 58158, U. S. Nat. Mus., ♂ adult, Orizaba, Vera Cruz, Mexico, June 24, 1894. Collected by E. W. Nelson and E. A. Goldman.

Similar to *M. fuscogriseus*, but the coloration is much lighter, the eye spots are larger, and the black of the head less intense and more restricted in area posteriorly; size and proportions apparently the same as in *fuscogriseus*.

Measurements.—Type: Total length, 627; head and body, 315; tail, 312; tarsus, 47 (collector's measurements in the flesh). The skin measurements show different proportions. While the total length is the same as above given, the length of the head and body is 310, and of the tail 317, which would give about the normal tail ratio. For further measurements see table of measurements below.

Skull.—The skull presents no appreciable difference from skulls of corresponding age of *M. fuscogriseus* from Nicaragua. The measurements of the type skull are as follows: Total length, 77; basal length,¹ 69; length of nasals, 37; zygomatic breadth, 39; postorbital processes, 14.3; postorbital constriction, 9; mastoid breadth, 25; palatal length, 42; palatal breadth at mm⁴ (including teeth), 22.5; upper toothrow, 27; upper molar series, 15. The specimen selected for type is much above average size, as shown by the measurements tabulated below.

EXTERNAL MEASUREMENTS.

Nat. Mus. No.	LOCALITY.	Sex.	Total Length.	Head and body.	Tail.	Tarsus.	Tail ratio.
100189	Montecristo, Tabasco, Mex.....	♂	555	267	288	44.5	108
100028	Frontera, " ".....	♂	556	265	291	46	110
100027	" " ".....	♀	508	254	254	43.5	100
100034	Teapa, " ".....	♂	585	275	310	47	111
100031	" " ".....	♂	582	280	302	47	107
100033	" " ".....	♂	542	253	289	43.5	110
100032	" " ".....	♀	542	254	288	41.5	112
100030	" " ".....	♀	505	241	264	41	109.5
100029	" " ".....	♀	558	265	293	43	110
77908	Huehuetan, Chiapas, ".....	♂	545	264	281	46	106
78003	Chicharras, " ".....	♀	524	254	270	43	106
58158	Orizaba, Vera Cruz, ".....	♂	627	315	312	47	99
58157	" " ".....	♀	490	250	240	38	96
63664	Montzorongo, " ".....	♀	488	220	260	40	118
65403	Tuxtepec, Orizaba, ".....	♂	580	265	315	46	119
65404	" " ".....	♂	580	280	300	45	107
92992	Metlatoyuca, Puebla, ".....	♂	517	240	277	43	115.4
92993	" " ".....	♂	527	245	282	44	115
92994	" " ".....	♂	578	298	280	48	94
92995	" " ".....	♂	585	283	302	46	106.7
92991	" " ".....	♀	475	222	253	40	114
Average	Teapa, etc., Tabasco,	4 ♂	569.5	272	298	46	109
	" " ".....	5 ♀	535	254	277.6	42.5	108.3
	Tuxtepec, Orizaba,	2 ♂	580	272.5	307.5	45.5	113
	Metlatoyuca, Puebla,	4 ♂	551.5	266.5	285	45.2	110.3

¹ From posterior base of incisors to front border of foramen magnum.

MEASUREMENTS OF SKULLS.

Nat. Mus. No.	LOCALITY.	Sex.	Total length.	Basal length.	NASALS.			Zygom. br'dth.	Postorb. proc.	Postorb. constr.	Mastoid br'dth.	PALATE.			Molar series.
					Length.	Gr. br'dth.	Least br'dth.					Length.	Br'dth at m ⁴ , outside.	Upper toothrow.	
58156	Orizaba, Vera Cruz, Mex.	♂	74	62	36	8	5	32.5	13	9	24	40	21	25	14
58158	" " "	♂	77	69	37	9.3	5	39	14.3	9	25	42	22.5	27	15
63663	Chichicaxtle, " "	♂	71.3	65.5	34	8	4.5	38	14	8.5	22.3	40	20.7	25	13.5
65405	Catemaco, " "	♂	73	67	34	8	4.3	37	13.5	8.5	22.5	40	21	26	14.3
63664	Motzorongo, " "	♂	60	55	28	7	3.5	30	10.5	8.5	18	35	18.5	23.3	13
93001	Papantla, " "	♂	64	57.5	30	7	4.5	32	11.3	8.6	19	36	19.5	25	14
93002	" " "	♂	64.5	57.5	30	6.6	4	31.5	11.3	8.5	19	36	19.5	24	13.3
65404	Tuxtepec, Oaxaca, " "	♂	69	61.5	32	7.6	4	34	12.5	8.3	21	38	21	25.3	14
77908	Huehuetan, Chiapas, " "	♂	69	61.7	32	7.3	4	35	12.7	8.2	20	39	20	25.5	14
78003	Chicharras, " "	♂	67	59	33	7.5	4.2	32.2	11.3	8.4	20	38	19	24	13.5
92991	Metlatoyuca, Puebla " "	♂	61	54	27	7	3.4	30	10	8	18.2	34	19	23	13
92992	" " "	♂	62	57	30.2	7.5	4	33	11.2	8.7	19.5	36	20	23.5	13
92993	" " "	♂	61.6	60	30	6.5	4	32	10.5	8.2	20	38	20	24.6	13.5
92994	" " "	♂	74.3	68	35	8.2	5.4	41	16	9	23	41	21	24	13
92995	" " "	♂	69	63.5	33	7	4	35.5	12	8.5	22	39	21	25	13
100027	Frontera, Tabasco, " "	♂	66.3	61	32.2	8	4.3	33	12	8.5	20	38	20	25	14
100030	Teapa, " "	♂	64.5	59	29	7	4	32.3	11.4	8	20	37.3	20	25	13.6
100032	" " "	♂	63	57.5	30.5	7.2	4	32	11.2	8	19.5	36	19.7	24	13.2
100033	" " "	♂	64	58.4	30.2	7	4	33	10.7	8.2	19.5	36	20.3	25	13
100031	" " "	♂	74.5	67.5	35.5	8	5	38	13	8	22	41	21	26	14.2
100028	Frontera, " "	♂	70	63	35	7.3	4.3	35	12.5	7	21	39.5	20	25.5	14

This pale northern form of *Metachirus fuscogriseus* is represented by a considerable number of specimens from the States of Tabasco, Vera Cruz, Oaxaca, and Puebla. They vary a little in coloration above, some being darker than others, but the difference is slight and partly seasonal. The lower surface varies in general tone from yellowish white to deep buffy white. Young specimens show gray areas on the sides of the abdomen, as in *M. fuscogriseus*. All the adult males show more or less strongly a sulphur yellow patch on the sides of the abdomen in front of the thighs, this tint varying from pale yellowish to strong greenish yellow. Several specimens differ from the average style through the intensity of the buff coloration on the throat and sides of the neck, which tint sometimes prevails as a strong buff wash over most of the lower surface. The greenish yellow patch in front of the thighs is characterized by a slightly different texture of the hair, and is represented in the female by a clearer white than the surrounding parts. Apparently it is a glandular area, and most active in the breeding season, corresponding doubtless to the glandular area on the lower throat and chest in *Didelphis*.

As shown in the tables of measurements, there is considerable variation in size, and some in proportions, in animals that have reached maturity, measurements being given of no specimens in which the last molar has not come into use, with other evidences of maturity. The largest specimen, which has perhaps unfortunately been taken for the type, is equalled in size by a single specimen from Greytown, also an old male. The ratio of length of tail to length of head and body varies in specimens from the same locality, as at Metlatoyuca, Puebla, from 94 to 115, with a total range of variation in this respect from 94 to 119, the average being 109. In young and middle-aged skulls there is barely a trace of a sagittal crest, but in old males it attains a height of 2 to 3 mm. The postorbital processes are but slightly developed in early life, reaching only a moderate development even in old age. The postorbital constriction is much less than in the allied genus *Didelphis*, to which in many respects the skull is closely similar. The nasals, however, are more pointed, both posteriorly and anteriorly, terminating at both extremities in attenuated points. The large series from Teapa and Frontera, Tabasco, appear not to show any average difference, either in coloration or size, from specimens from Metlatoyuca, Puebla, and further subdivision of the material seems at present unnecessary.

***Metachirus grisescens*, sp. nov.**

Type, No. 15072, Am. Mus. Nat. Hist., ♀ adult, Rio Cauca, Colombia, June, 1899; J. H. Batty.

Somewhat similar to *Metachirus fuscogriseus pallidus*, but much paler throughout with the tail uniform dark brown, not light at the tip as in the *M. fuscogriseus* group. General coloration above gray, varied with black; below whitish, with a slight buffy suffusion; eye spots and head markings as in *M. fuscogriseus*, the black, however, less intense, and much less extended posteriorly. While the general coloration above is blackish varied with gray in *M. fuscogriseus*, in the present species it is gray varied with blackish.

Measurements (from the dried skin).—Total length, 510; head and body, 260; tail, 240; tarsus, 38; tail ratio, about 91. These measurements are only approximate, as the tail is not wholly filled out and the specimen is not well prepared, the skin evidently being much shrunken. The ears are small, about 20 by 17 mm. in the dry skin.

Skull.—The skull differs from that of *Metachirus fuscogriseus* in the great expansion of the posterior portion of the nasals, which maintain a uniform

breadth for about 4 mm. beyond the point of greatest expansion, then taper suddenly and end abruptly, instead of converging evenly to a slender point. The palatal vacuities are also unusually developed, as much so as is ordinarily the case in *Didelphis*. The skull is large for the size of the skin, which is sexed by the collector as a female. Total length, 68; basal length, 62; length of nasals, 33; zygomatic breadth, 36; postorbital processes, 15; postorbital constriction, 9; mastoid breadth, 37.6; breadth across mm ⁴, 19.5; length of upper toothrow, 23; upper molar series, 13.

This species is based on a single specimen from Rio Cauca, Colombia, collected by Mr. J. H. Batty, June, 1899. It differs from the Mexican and Central American forms in its very light coloration and in the tail being uniformly blackish brown without the usual light tip. The skull is peculiar for a member of this genus in the large size of the palatal vacuities and in the great breadth of the posterior third of the nasals, which have more the form of the nasals in *M. nudicaudatus*. It differs, however, from this species through its much larger size and different coloration, and in the basal two inches of the tail being furred.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry. Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	" 4.75	" IX, 1897.....	" 4.75
" III, 1890-91.....	" 4.00	" X, 1898.....	" 4.75
" IV, 1892.....	" 4.00	" XI, Part I, 1898	" 1.25
" V, 1893.....	" 4.00	" " II, 1899	" 2.00
" VI, 1894.....	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	" 4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London;

J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

The Knickerbocker Press, New York

Article XXII. — THE GENERIC NAMES OF THE ME- PHITINÆ.

By J. A. ALLEN.

In Mr. Arthur H. Howell's recent 'Revision of the Skunks of the Genus *Chincha*'¹ radical changes are made in the nomenclature of the North American Skunks, which involve a complete overturning of the generic names of the North American Mephitinæ. *Chincha* Lesson is adopted for the group hitherto known as *Mephitis*, and *Mephitis* is transferred to the Little Striped Skunks known of late as the genus *Spilogale*, the latter name becoming a synonym of *Mephitis*. As *Thiosmus* Lichtenstein, 1838, is adopted for the Bare-nosed Skunks of Mexico and the southern border of the United States,—*Conepatus* Gray, 1837, being restricted to the South American species,—the hitherto current generic names of all the Skunks found north of Panama are changed. Mr. Howell's paper is in other respects such an admirable piece of work that it is all the more to be regretted that the changes in the generic names affecting *Mephitis* and *Spilogale* rest on a faulty basis.²

Mr. Howell's reasons for accepting *Chincha* in place of *Mephitis* are as follows :

"Lesson proposed this as the name of a subgenus of *Mephitis*, with *Chincha americana* as the type species ; *hudsonica* Richardson is given as a variety, but no other species are placed in the group. The references show that his type species is based on *Viverra mephitis* Erxleben, which in turn is based on *V. mephitis* Schreber—a plainly recognizable species. If we assume (as we can with all propriety) that Cuvier, in placing '*Viverra mephitis* L.' as one

¹ 'North American Fauna,' No. 20, pp. 1-62, pll. i-viii. Aug. 31, 1901.

² At this point, in justice to Mr. Howell, it seems proper to confess my own shortcoming in the matter. When in Washington last April I not only learned of the conclusion Mr. Howell had reached regarding the generic names of the Skunks, but I was consulted as to whether some way could not be devised whereby such a lamentable *bouleversément* might be avoided. I had then neither the time nor opportunity for a proper investigation of the points at issue, but on returning to New York, I carefully reviewed, by Mr. Howell's request, the pros and cons of the case as then understood. The chief question was whether or not Gray's sections *a* and *b* of *Mephitis* (Charlesworth's Mag. Nat. Hist., I, 1837, p. 581) could be construed as restricting *Mephitis* to the North American large Skunks, on account of his later giving the name *Spilogale* to his section *b* (P. Z. S., 1865, p. 150). I then wrote to Mr. Howell that I saw no escape from the proposed changes involving the terms *Mephitis*, *Chincha*, and *Spilogale*. Unfortunately, however, the real points at issue were wholly overlooked. In posting my MS. card catalogue of American Mammals soon after the publication of Mr. Howell's paper, I was astonished on looking up the various questions of nomenclature involved to find that *Chincha* of Lesson was a synonym of the restricted genus *Mephitis*. It seems strange, and is lamentable, that this point should have been previously overlooked by both Mr. Howell and myself.

of the types of his genus *Mephitis* referred to *V. mephitis* of Gmelin's edition, we then have for the type of *Chincha* a species which is one of the two originally composing the Cuvierian genus *Mephitis*, and one that is likewise identifiable, for *V. mephitis* Gmelin is based on *V. mephitis* Schreber.

"It is perfectly clear, therefore, that Lesson intended to apply the name *Chincha* to the large two-striped North American skunks, and it is used for these in a generic sense in the present paper."

The whole question thus depends on the supposed availability of Lesson's generic name *Chincha* for the North American large skunks, while this in turn, according to Mr. Howell, rests solely on the applicability of *Viverra mephitis* of Schreber to some of the several species occurring in North America. In reality, however, *Viverra mephitis* of Gmelin and Schreber has no important bearing on the case of *Chincha* since *Mephitis*, in a restricted sense, had already been twice assigned to the large two-striped skunks of North America before *Chincha* was proposed.

THE GENUS *Mephitis* CUVIER.

The genus *Mephitis*, as is well known, was established by Cuvier for the 'Mouffettes,' in the first 'tableau' of his 'Leçons d'Anatomie Comparée,' published in the year 1800, and is equivalent to his division *c* of *Mustela* of his 'Tableau élémentaire de l'Histoire naturelle des Animaux' (p. 116) of two years' earlier date. He there designated the group simply as 'Les Mouffettes,' and placed in it only two species, as follows:

"11. Le cone pate. (*Must. putida*.) *Viverra putorius* L."

"12. Le chinche. (*Must. mephitis*.) *Viverra mephitis* L."

The first is evidently, by the diagnosis and the synonymy, the *Viverra putorius* of Linnæus and Gmelin, based primarily on Catesby and Kalm, here renamed *Mustela putida*. It has long been my opinion that *Viverra putorius* Linn. is referable, if to anything, to the large skunks of eastern North America and not to the little striped skunks, as some have claimed. As stated by Bangs (Proc. Bost. Soc. Nat. Hist., XXVIII, 1898, p. 223), it is composite, being apparently "a combination of *Mephitis mephitis* and *Spilogale ringens*." Catesby's figure, however, has little resemblance to either, and may fairly be considered as drawn off-

hand from a confused recollection of these two animals, and hence factitious. His figure has been copied time and again by later compilers, who have accompanied it by descriptions obviously based on the figure rather than on anything in nature. Even Kalm, who knew personally the skunks of Pennsylvania and the country thence northward, seems to have taken his account of its external features mainly from Catesby's figure. His general account of the animal was obviously based only slightly on personal observation, and mainly on information derived from the people among whom he lived or travelled; it of course relates to the common large skunk of Pennsylvania, New Jersey, and perhaps New York, as he was apparently never within several hundred miles of the region of *Spilogale*. The *Viverra putorius* of Schreber, Erxleben, and Gmelin, and the 'Striated Weasel' of Pennant all have practically the same basis, namely, Catesby and Kalm.

Cuvier's 'Conepate,' there is every reason to believe, is 'le conepeate' of Buffon (Hist. Nat., XIII, 293), who first employed the name in a technical sense. Buffon says: "Le conepeate a sur un fond de poil noir cinq bandes blanches qui s'étendent longitudinalement de la tête à la queue." In a footnote he gives a long extract from Kalm, and cites no other author. Cuvier's diagnosis is practically identical with Buffon's, and Gmelin's is not materially different, all being based primarily on Catesby and Kalm. Kalm identified his animal with that described and figured by Catesby, and says: "Dr. Linnæus calls it *Viverra putorius*." Thus Cuvier's Conepate—which he here names *Mustela putida*, and identifies with Linnæus's *Viverra putorius*—is, there is every reason to suppose, the animal so called by Buffon, namely, the common skunk of eastern Pennsylvania described by Kalm, and not a species of *Spilogale*.

Cuvier's second species of Mouffette is 'le chinche,' his short diagnosis being obviously based on 'le chinche' of Buffon. Although he refers to it as found throughout America, his only reference is to Fueillée, who describes a skunk from southern South America, and hence a species of *Conepatus*. Buffon's figure and brief diagnosis (Hist. Nat., XIII, p. 294 and pl. xxxix), and Daubenton's description (L. c., p. 300), however, appear to have been based on a North American specimen of true *Mephitis*, as

will be noticed more fully later in discussing *Viverra mephitis* Schreber. We thus find that neither of Cuvier's two species of Mouffette is involved with *Spilogale*.

This is quite contrary to the conclusion reached by Mr. Howell (*l. c.*, p. 14), who says the removal in 1842 by Lesson of Cuvier's first species to become the type of *Chincha* leaves his second species (the Conepate), "one of the little spotted skunks, as the type of *Mephitis*"; and that "the name *Spilogale*, proposed in 1865 by Gray for the little spotted skunks, will therefore have to be abandoned, becoming a synonym of *Mephitis*." His conclusion in regard to *Spilogale* is, as shown above, obviously erroneous, the fact being that Cuvier's original genus *Mephitis* in no way or manner included any member of Gray's later genus *Spilogale*.

The first effective revision of *Mephitis* was made by Gray in 1837 (Charlesworth's Mag. of Nat. Hist. and Journ. of Zoöl., etc., I, 1837, p. 581), when he removed the bare-nosed skunks of South America to form his genera *Conepatus* and *Marputius*, and restricted *Mephitis* to the large skunks of North America. At the same time he also divided *Mephitis* into two groups, designated as *a* and *b*, placing in the former only two species (described as new) of the large two-striped skunks, and in the latter a single species of the little spotted skunks, described as new under the name *Mephitis bicolor*.

In 1865 (P. Z. S., 1865, pp. 150) he named his section *b Spilogale*, with *Mephitis interrupta* Rafinesque as the type and only species, to which he refers his own *M. bicolor*, the only species placed in his section *b* in 1837; *Conepatus* is retained exclusively for the South American large skunks, and *Marputius* is properly assigned as a synonym of *Conepatus*. The dismemberment of the old genus *Mephitis* thus made by Gray was not only based on a proper recognition of the facts in the case, but has stood without question until Mr. Howell brought forward the case of *Chincha* Lesson.

Lichtenstein, in 1838, in his elaborate and excellent memoir 'Über die Gattung *Mephitis*' [Abhandl. der Königl. Akad. der Wissensch. zu Berlin, Phys. Klasse, 1836 (1838), pp. 249-313, pll. i, ii], divided the genus *Mephitis* into two subgenera, namely, *Thiosmus* (*l. c.*, p. 270), for the bare-nosed skunks of Mexico and

South America, and "*Mephitis* Cuv. s. str." (*l. c.*, p. 276), for the North American skunks collectively, including the forms later separated by Gray as *Spilogale*. Lichtenstein's *Thiosmus* is thus the equivalent of Gray's *Conepatus* and *Marpulius* combined, both of which terms he rejects on account of their being such barbarous distortions ("solch barbarische Verzerrungen"). His restricted subgenus *Mephitis*, more explicitly than Gray's restricted genus *Mephitis*, covers all the then known North American skunks not referable to the previously established genus *Conepatus*. The later removal by Gray in 1865 of the little striped skunks to form the genus *Spilogale* was therefore a perfectly proper and tenable proceeding, while Lesson's attempt to establish a genus *Chincha* in place of the previously properly restricted *Mephitis* was wholly unjustifiable and ineffective. Although Lesson had Lichtenstein's able exposition of the skunks for a guide, he could hardly have made a worse jumble of the group, as regards either the 'subgenera,' species, or nomenclature.

Lesson's restricted 'sous-genre' *Mephitis*, consisting of three species, includes one each of the present genera *Conepatus*, *Mephitis*, and *Spilogale*, in the order named, his first being a pure synonym of his first species of *Thiosmus*; his second, if it can be identified at all, is Buffon's Conepate, and hence, as already explained, is the form of *Mephitis* occurring in Pennsylvania and New Jersey; while the third is Rafinesque's *Mephitis interrupta*, and hence a *Spilogale*.

THE GENUS *Spilogale* GRAY.

As Lesson's action in proposing *Chincha*, and his consequent transference of *Mephitis* to a group which by chance included a species of *Spilogale*, is void, the erection of the genus *Spilogale* by Gray in 1865 was, as already said, a perfectly legitimate proceeding.

In this connection it is interesting to trace the history of the first recognizable species of *Spilogale*. This proves to be the *Viverra zorilla* Schreber (*Säug.*, III, 1776, p. 445, pl. cxxiii), based primarily on 'le zorille' of Buffon (*Hist. Nat.*, XIII, pp. 289, 295, pl. xli), the description being from Daubenton (Buffon, *l. c.*, p. 302), and the plate an accredited copy of Buffon's. Buffon tells us he gave it the name zorille, "qu'elle porte au Pérou

et dans quelques autres endroits des Indes espagnoles." The description and figure indicate beyond question a species of *Spilogale*, but the locality is, of course, not Peru, but probably Mexico. G. Cuvier wrongly claimed¹ that Buffon's plate represents "un animal du Cap de Bonne-Espérance, que Buffon a mal-à-propos considéré comme propre à l'Amérique"; and this is doubtless why he in his 'Tableau élémentaire de l'Histoire naturelle des Animaux' (p. 116), published three years before the date of this note, placed the "*Viverra zorilla* Lin." (= Gmelin) in his group 'b, *Martes*,' instead of with the Mouffettes, thus formally excluding the only then known species of *Spilogale* from his group c, 'les Mouffettes,' which two years later became his genus *Mephitis*.

The next species of *Spilogale* to be made known, and the first definite and distinct mention of any form of *Spilogale* under *Mephitis*, is the *Mephitis interrupta* Rafinesque, described in 1820.

THE *Viverra mephitis* SCHREBER.

As Mr. Howell has adopted the specific name *mephitis* for the Canada Skunk, in the belief that Schreber's *Viverra mephitis* relates to this form, it seems desirable to consider its character.

Viverra mephitis of Schreber (Säug., III, 1776, p. 444, pl. cxxi) was based primarily and almost exclusively on the animal described and figured by Buffon and Daubenton as 'le chinche' (Buffon, Hist. Nat., XIII, pp. 294, 300, pll. xxxix). That the basis of *Viverra mephitis* Schreber is Buffon's 'le chinche' is shown:

(1) By Schreber's description, which is a slightly abridged paraphrase of Daubenton's description of that animal (Buffon, *l. c.*, p. 300), and it is duly accredited to Daubenton by Schreber.

(2) Schreber's plate is an avowed copy of Buffon's (see list of plates, p. 588 of Vol. III of Schreber's Säug.).

(3) The vernacular name employed is "der Chinche," showing further the particular animal he had in view.

Schreber cites three previous authors, namely, Linnæus, Buffon, and Pennant. He cites Linnæus as follows:

"*Viverra mephitis*. LINN. *syst. nat. ed. 10. p. 44. n. 2.* Die Beschreibung gehört hieher, nicht aber die Namen."

¹ Azara's *Essais sur l'hist. Nat. des Quadr. de la Prov. du Paraguay*, I, 1801, pp. 238, 239 (note on Azara's account of his Yagouaré).

Viverra mephitis should hence read *memphitis*, not *mephitis*. The name *Viverra mephitis* is thus not Schreber's, but merely his emendation of the Linnæan name *memphitis*, as shown by his use of the name on the plate and in the list of plates on p. 588, where he says: "*Viverra mephitis* Linn."¹ As is well known, the Linnæan *Viverra memphitis* is based on the "Ysqueipatl" of Hernandez, which, as already explained by Mr. Bangs (Proc. Boston Soc. Nat. Hist., XXVI, 1895, p. 351), is a compound of the Mexican Coati and some Mexican Skunk, as likely to have been a *Conepatus* or a *Spilogale* as a *Mephitis*. In any case, the name has long been ruled out as unavailable in nomenclature.

(2) Buffon is cited as follows:

"Chinche. BUFF. 13 p. 294. tab. 39."

(3) The reference to Pennant is given thus:

"Skunk weesel. PENN. *syn. p.* 233. *n.* 167. mit Ausschluss der Anführung des Kalm."

He thus excludes an important part of Pennant, since Kalm unquestionably wrote of the common large skunk of eastern North America. It is also to be noted in this connection that he follows Linnæus in again citing Kalm under his *Viverra putorius*, which is also a Linnæan name. Pennant's 'Skunk Weesel' is well known to be composite, relating collectively to the then known skunks of both North and South America. Of its range, Pennant says: "Inhabits *Peru*, and *North America*, as far as *Canada*."

From the foregoing it will be seen that what there is in Schreber's *Viverra mephitis* relating to North America are certain references given by Pennant (not otherwise cited by Schreber), and his reference to Buffon's chinche. Respecting the geographical distribution of this animal Buffon explicitly states that it appertains to the hottest climates of South America, and is not found in New Spain, Louisiana, Illinois, and Carolina, as shown by the following transcript from Buffon's article: "De ces quatre espèces de mouffettes, que nous venons d'indiquer sous les noms de *coafe*, *coneplate*, *chinche* & *zorille*, les deux dernières appartiennent aux climats les plus chauds de l'Amérique méridionale, . . . Les

¹ Doubtless Schreber, as have most authors since his day, considered *memphitis* as a typographical error for *mephitis*. As to whether Linnæus purposely wrote *memphitis*, see Howell, *l. c.*, p. 18.

deux premiers sont du climat tempéré de la nouvelle Espagne, de la Louisiane, des Illinois, de la Caroline, &c."

It must, however, be conceded that Buffon's brief description and plate, and the fuller description by Daubenton, indicate an animal with a head wholly black except a white longitudinal stripe on the front, which shows that the specimen in hand could not, so far as we now know, have come from South America. Both 'le chinche' and 'le zorille' were described and figured from poorly stuffed skins in the cabinet of "M. Aubry, Curé de Saint Louis," in Paris (*cf.* Buffon, *l. c.*, p. 289), without definite indication of the country whence they came, although Buffon evidently supposed they both came from either Peru or some part of the Spanish possessions in America ("nouvelle Espagne"). The most logical conclusion is that both came from Mexico and that 'le chinche,' and consequently Schreber's *Viverra mephitis*, is referable to *Mephitis macroura* Licht. rather than to any species from the United States or Canada.

SUMMARY.

To summarize the foregoing rather intricate discussion, the leading points may be thus stated :

1. *Mephitis* Cuvier was restricted to the large two-striped skunks and the little striped skunks of North America by Gray in 1837, through the removal of the bare-nosed skunks of Mexico and South America to form the genus *Conepatus*.

2. *Mephitis* was again restricted by Lichtenstein in 1838 by explicitly limiting the Cuvierian *Mephitis* to the North American large and small skunks, and proposing *Thiosmus* for the bare-nosed skunks, *Thiosmus* thus becoming a synonym of *Conepatus*, discarded on account of the barbarous origin of the word.

3. Consequently when *Chincha* was proposed by Lesson in 1842, ostensibly for the large two-striped skunks of North America, it became a synonym of *Mephitis* as previously restricted by both Gray and Lichtenstein.

4. The transference of *Mephitis* by Lesson in 1842 to a heterogeneous group, the last species of which chanced to be *Spilogale*, was hence void.

5. No identifiable species of *Spilogale* was included in the

Cuvierian genus *Mephitis*; the only species of *Spilogale* known to Cuvier in 1788 was referred by him to his group 'Martes' and excluded from his group 'les Mouffettes'; hence *Mephitis* could not later be transferred to the *Spilogale* group.

6. *Viverra memphitis* Linn. is a compound of the Mexican Coatis and Mexican Skunks, and is not citable as a term entitled to consideration in nomenclature; and it has been generally so treated by authors.

7. *Viverra putorius* Linn. is based primarily on Catesby's figure and description of his *Putorius americanus striatus*, neither of which is entitled to serious consideration; they must have been based, to take the most charitable view of the case, on a confused recollection of the little spotted skunk and the common skunk, and not on any animal he ever met with in nature.

8. If Linnæus's reference to Kalm is to have weight, his *Viverra putorius* would have to be referred to the common skunk, a proceeding as unwarranted as it would be undesirable. Hence, it would be better to treat the name as uncitable, and as thoroughly unavailable in nomenclature as is Linnæus's *Viverra memphitis*.

9. *Mustela putida* Cuvier, 1798, based on the Pole-cat of Kalm, antedates *Mephitis putida* Boitard, 1842, for the same animal.

10. *Viverra mephitis* Schreber, 1776, relates primarily to some species of Howell's subgenus *Leucomitra*, probably *Mephitis macroura* Licht., and not to the skunk of eastern Canada. It cannot, however, be positively identified.

SPECIES AND SUBSPECIES OF THE GENUS *Mephitis*.

Accepting Mr. Howell's excellent revision of the skunks of this genus as fairly representing our present knowledge of the group, the species and subspecies will stand as follows, the specific and subspecific names being those employed by Mr. Howell, except in the case of *Mephitis mephitis* Shaw and *Mephitis putida* Boitard.

SUBGENUS *Mephitis*.

1. *Mephitis mephitis* (Shaw).¹
2. *Mephitis hudsonica* (Rich.).
3. *Mephitis putida* (G. Cuv.).²

¹ As restricted by Bangs. Not *Viverra mephitis* Schreber, as supposed by Mr. Howell.

² *Mustela putida* G. Cuvier, 1798, which thus antedates *Mephitis putida* Boitard, 1842. It seems quite probable that Boitard took his name from Cuvier.

4. *Mephitis elongata* (Bangs).
5. *Mephitis mesomelas* (Licht.).
6. *Mephitis mesomelas avia* (Bangs).
7. *Mephitis mesomelas varians* (Gray).
8. *Mephitis estor* Merriam.
9. *Mephitis occidentalis* Baird.
10. *Mephitis occidentalis spissigrada* (Bangs).
11. *Mephitis occidentalis notata* (Howell).
12. *Mephitis occidentalis major* (Howell).
13. *Mephitis occidentalis holzneri* Mearns.
14. *Mephitis platyrhina* (Howell).

SUBGENUS *Leucomitra* HOWELL.

15. *Mephitis macroura* Licht.
16. *Mephitis macroura milleri* (Mearns).
17. *Mephitis macroura vittata* (Licht.).

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx; with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume VIII, 1896.....	Price, \$4.00
" II, 1887-90.....	4.75	" IX, 1897.....	4.75
" III, 1890-91.....	4.00	" X, 1898.....	4.75
" IV, 1892.....	4.00	" XI, Part I, 1898	1.25
" V, 1893.....	4.00	" " II, 1899	2.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00	" XIII, 1900.....	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London ;

J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of *Diplodocus*. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May 1899. Price \$2.00.

(Continued on 3d page of cover.)

*New South American Muridæ and a
New Metachirus.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XIV, ARTICLE XXIV, pp. 405-412.

New York, November 30, 1901.

The Knickerbocker Press, New York

Article XXIV.—NEW SOUTH AMERICAN MURIDÆ
AND A NEW METACHIRUS.

By J. A. ALLEN.

Of the nine species described in the present paper eight are based on material in the British Museum.

In this connection I take the opportunity to express my appreciation of the great kindness shown me by Mr. Oldfield Thomas, Curator of Mammals, during a few weeks spent at the British Museum the past summer, chiefly in the study of South American Rodents. He not only allowed me unrestricted use of the material under his charge, but greatly aided me in many ways in my researches. The following descriptions of new species were written in response to his generous solicitation.

***Oryzomys bolivaris*, sp. nov.**

Type, No. 99-9-9-27, British Museum. ♂ adult, Porvenir, Bolivar, Ecuador, altitude 1800 m., March 10, 1899; collected by P. O. Simons. Original No. 251.

Above medially very dark brown, punctated with ferruginous, the general effect being what might be called dark chestnut brown; sides lighter, more yellowish brown, becoming gradually paler towards the ventral surface, which is sharply defined and dull white, the fur being plumbeous at base and broadly tipped with soiled white; upper surface of fore and hind feet nearly naked, dull flesh color, soles blackish brown; ears rather small, dark brown; tail naked, pale brown, nearly unicolor.

Measurements (of type and only specimen).—Total length, 225 mm.; head and body, 125; tail, 100; hind foot, 29; ear, 18.

The skull presents nothing distinctive; it is rather narrow for its length, with rather a broad postpalatal opening and rather large palatal foramina. The teeth are of medium size, but in the single specimen are greatly worn. Total length, 30.2; basilar length, —; zygomatic width, 15.2; mastoid width, 12; postorbital width, 5.2; length of nasals, 12; length of palate, 6; palatal foramina, 6; upper tooththrow, 4.5; length of lower jaw, 16; height of condyle, 8.5; lower tooththrow, 4.8.

This species is characterized by the dark color of the dorsal surface, small ears, and tail considerably shorter than the head and body. In coloration it somewhat resembles the *S. magdalenæ* group, but the general effect is much darker and more bordering on dark chestnut than yellowish brown, but from which group

it differs in its relatively somewhat shorter tail and very much smaller ears. Known at present only from the type specimen.

***Oryzomys castaneus*, sp. nov.**

Type, No. 1-3-19-11, British Museum, ♀ adult, St. Javier, northern Ecuador, altitude 60 feet, July 28, 1900; collected by G. Flemming and R. Miketta. Orig. No. 171.

Similar in texture of pelage and coloration to *O. nitidus*, but much smaller, with relatively as well as absolutely much weaker dentition. General color above dark reddish brown or light chestnut, paler, more yellowish brown on the sides; below dull whitish or soiled grayish white, the fur being plumbeous at base and broadly tipped with whitish. Upper surface of fore and hind feet nearly naked, flesh color, palms flesh color, soles dark brown; ears of medium size, brown; tail much shorter than head and body, naked, pale brown above, slightly lighter below.

Measurements (of type and only specimen).—Total length, 223 mm.; head and body, 118; tail, 105; hind foot, 29; ear, 19. Skull of the typical form for the genus, with a well-developed supraorbital bead, running back to the parieto-occipital suture; interparietal large; posterior palatal opening broad for the size of the skull; palatal foramina small; molar dentition weak. Total length, 30; basilar length, —; zygomatic width, 14.4; mastoid width, 11.3; postorbital width, 5.3; length of nasals, 11.2; interparietal, 3×9 ; length of palate, 7; palatal foramina, 4; upper toothrow, 4.1; lower jaw, length, 15; height at condyle, 7.8; lower toothrow, 4.6.

This species, at present known only from the type, bears a close resemblance in coloration to *O. nitidus* (*Hesperomys laticeps*, var. *nitidus* Thomas, type, 85-4-1-41, Br. Mus), from Amable Maria, Central Peru (P. Z. S., 1884, 452, pl. xlii, fig. 1), but is smaller, with a very much shorter and narrower hind foot (27 against 30.5 in *O. nitidus*, type, both from dry skins), relatively shorter tail, and much weaker molar dentition.

***Oryzomys perenensis*, sp. nov.**

Type, No. 0-7-7-25, British Museum, ♂ adult, Perené, Department of Junin, Peru, April 11, 1900; altitude 800 m. Collected by P. O. Simons; collector's No. 930.

Very similar in coloration, texture of pelage, size, and proportions to *O. magdalenæ* Allen, but with the skull much broader and the dentition much heavier.

Measurements (of type).—Total length, 237 mm.; head and body, 125; tail, 112; hind foot, 31; ear, 22. Seven adults range in total length from 227 to 260 (one very old male reaches 279); length of head and body, from 118 to 135 (with one, 144); tail length, 105 to 125 (one, 135); hind foot, 28-33; ear, 20-25.

The skull and teeth present no differences of distinctive importance. Compared with *O. magdalena*, its nearest known ally, the skull is much broader throughout, with the teeth of the molar series about one third broader. Total length, 34; basilar length, 21.6; zygomatic width, —; mastoid width, 13; postorbital width, 5; length of nasals, 13; palatal length, 8; palatal foramina, 5; length of upper tooththrow, 5; length of lower jaw, 17; height at condyle, 8.6; lower tooththrow, 5.8.

This species is based on a series of 11 specimens, collected by Mr. P. O. Simons at Perené, Department of Junin, Peru, at an altitude of 800 m., in March and April, 1900. The series includes several young adults, which are darker, especially along the median line above, with less of the yellowish brown of the adults. One old male (No. 0-7-7-25) is much larger than the rest of the series and of a rather deeper brown above. One young example (No. 0-7-7-26) is exceptional for the strong wash of pale yellowish brown on the sides.

Externally this form is not readily distinguished from *O. magdalena*, but the two are easily separable on comparison of the skulls. Both are apparently geographical forms of *O. laticeps*.

***Oryzomys rivularis*, sp. nov.**

Type, No. 1-1-6-5, British Museum, ♀ adult, Rio Verde, northern Ecuador, altitude 3200 feet, Nov. 28, 1899; collected by R. Miketta.

In coloration throughout essentially like *O. bolivaris*, but much larger and with the tail much longer than head and body.

Measurements (of type and only specimen).—Total length, 238 mm.; head and body, 111; tail, 127; hind foot, 32; ear, 17.

Skull narrow and slender, as in *O. magdalena*, but the rostral portion still more elongated and narrower, the zygomatic branch of maxilla broader, the anterosuperior border more produced, and the enclosed foramen less expanded laterally; posterior palatal opening broader; dentition weak, as in *O. magdalena*. Total length, 32; basilar length, 23.6; zygomatic width, 15; mastoid width, 12; postorbital width, 6; length of nasals, 7; length of palate, 7; palatal foramina, 4; upper tooththrow, 4.6; length of lower jaw, 17; height at condyle, 8; lower tooththrow, 5 mm.

This form closely resembles *O. bolivaris* in coloration and in the small size of the ears, in comparison with these members in the *O. laticeps* group, and from which group it further differs in the length of the tail, considerably exceeding that of the head and body. Known at present only from the type, in which the body is much overstuffed, it greatly exceeding the measurements taken from the specimen in the flesh.

***Phyllotis chacoënsis*, sp. nov.**

Type, No. 98-5-14-2, British Museum, ♀ adult, Waikthlatingwayalwa, Chaco boreal, Paraguay; Graham Kerr, Sept. 5, 1897.

Pelage thick and soft. Above strongly yellowish brown, varied with black-tipped hairs, chiefly on the back; sides with fewer black-tipped hairs, and more strongly yellowish, or ochraceous buff; nose and top of head more grayish; cheeks like the sides; below pure white to the base of the hairs; fore arm, thighs, and hind legs like adjoining parts of the body; upper surface of fore and hind feet white, well clothed; palms and soles naked, the former flesh color, the latter darker, or brownish flesh color; ears large, dull brown, thinly haired on both surfaces; a small yellowish white tuft at posterior base of ear; tail much longer than head and body, bicolor, dark brown or blackish above, white below, well haired, the hairs increasing in length toward the end of the tail, forming a brushy pencil at the tip.

Measurements.—Total length (of type), 327 mm.; head and body, 142; tail, 185; hind foot, 31 (without claws, 33 with claws); ear, 24. Another specimen gives the following measurements, taken from a well-made skin: Total length, 267; head and body, 120; tail, 147; hind foot, 29; ear, 18.

Skull long and narrow, with a narrow brain case, interparietal very broad, the anterosuperior border of the maxillary plate of the zygoma produced to form a slight angle, in this feature diverging from the *Phyllotis darwini* type toward *Eunomys*; bullæ large; molars (including m^2) nearly as in *Phyllotis darwini*, but bullæ much larger, molar series much broader, and brain case relatively much narrower. The type skull measures as follows: Total length, 38; basilar length, 29; length of nasals, 16; zygomatic breadth, 18; mastoid breadth, 14; interorbital breadth, 6; palatal length, 7.2; palatal foramina, 8×2.5 ; upper tooththrow, 5; lower jaw (from inner base of incisors to condyle), 19; height at condyle, 10; lower tooththrow, 5.3.

This species resembles most nearly *Phyllotis griseoflavus* (Waterh.), with the type of which it has been compared, but from which it differs in its brighter, more buffy coloration, and in the fur on the ventral surface being wholly white to the base, instead of basally pale plumbeous. It is also apparently larger. The type locality of *P. griseoflavus* is the mouth of the Rio Negro, Patagonia, to which species three other specimens from Chupat, Patagonia, are evidently referable. The type locality of *P. chacoënsis* is the northern Chaco country of Paraguay, northwest of Asuncion.

P. chacoënsis is based on three specimens from Waikthlatingwayalwa. They all agree very closely in external features, including the wholly white fur of the ventral surface.

Phyllotis cachinus, sp. nov.

Type, No. 97-5-5-19, British Museum, ♀ adult, Upper Cachi River, Salta, Argentina, collected and presented by Prof. Spegazzini.

Similar to *P. griseoflavus* in general coloration, but with the pelage of the ventral surface pale grayish at extreme base, instead of deep plumbeous for the basal half or more. It also differs from *P. griseoflavus* in the skull being broader, including both the brain case and the rostral portion, with very much heavier dentition, the molar series being one-third broader as well as longer, and with a much heavier lower jaw.

It differs from *P. chacoënsis* in its shorter parietal (11×3 as against 11×4 in *P. chacoënsis*), heavier dentition, more inflated bullæ, and smaller size.

Measurements (of type).—Total length, 296 mm. ; head and body, 137; tail, 159; hind foot, 29; ear, 24.

Skull about as in *P. griseoflavus* and *P. chacoënsis*, except in its rather greater relative breadth as compared with the former, and its short interparietal as compared with the latter, and much heavier dentition in comparison with either. Total length, 35; basilar length, 27; zygomatic breadth, 17; mastoid breadth, 14.5; interorbital breadth, 5; length of nasals, 15.5; palate, 6.8; palatal foramina, 7.2×2.5 ; interparietal, 11×2.8 ; upper toothrow, 5.4; lower jaw (inner base of incisors to condyle), 19; height at condyle, 9; lower toothrow, 5.7.

A specimen from the Lower Cachi, No. 79-5-5-18, ♀, from the same collector, with an imperfect skull, seems better referable to *P. chacoënsis*, it having the ventral pelage snow-white to the roots, and weaker dentition.

Doubtless *griseoflavus*, *chacoënsis*, and *cachinus* will prove to be closely related forms of the same species, but they show features of difference worthy of note, and, moreover, inhabit quite different faunal districts. The first two are chaco forms, widely separated geographically, while the latter is from the mountain district northwest of Salta.

Eligmodontia morgani, sp. nov.

Type, collector's No. 127, ♀ adult, Arroya Else, Patagonia, April 17, 1895; coll. A. E. Colburn.

Pelage very full, long, and soft. Above dull ochraceous gray, finely lined with black, sides paler and more buffy, passing into a well-defined pale yellowish lateral line, extending from the sides of nose to the base of the tail; lower parts pure white, the fur plumbeous at base, the apical half white; ears medium, dusky brown externally, pale buffy gray internally; tail about as long as head and body, sharply bicolor, dark brown above, grayish white below, well

haired and slightly penicillate; fore and hind feet above grayish white, well covered with short hairs; soles and palms flesh color, sparsely haired, the flesh-colored skin barely showing through the hairs.

Measurements.—Total length (of type), 165 mm.; head and body, 85; tail, 80; hind foot, 23; ear (from dry skin), 13.

Skull much as in *E. elegans* but rather smaller, and with the same character of dentition. Total length, 24; basilar length, 17.5; zygomatic breadth, 12; mastoid breadth, 11; interorbital breadth, 4; length of nasals, 10; palate, 5; palatal foramina, 5×2 ; interparietal, 11×2.5 ; upper tooththrow, 4; lower jaw, 12; height at condyle, 5.3; lower tooththrow, 4.

This species has externally the appearance of a small-eared *Phyllotis* with furred soles. Its nearest known ally appears to be *E. elegans*, from which it differs in having much smaller ears and a shorter tail, the foot and body being nearly as in *E. elegans*.

The type of *E. elegans* was collected by Darwin at Bahía Blanca and is much changed in color by exposure for a long time (formally) as a mounted specimen. Two other specimens in fair condition from Chupat, northern Patagonia, identified as *E. elegans* by Mr. Thomas, very closely resemble in color the series of *E. morgani* from Sta. Cruz, but differ from them strikingly in their much larger ears and much longer tails. There are no flesh measurements, but the vertebræ still remain in the tail and the skins are fairly made up. Head and body (in skin), 78; tail vertebræ, 97; ear from notch, 19. The other specimen has the same proportions but is a little smaller.

This species is based on a large series of specimens collected at or near Cape Fairweather, Patagonia, by Mr. A. E. Colburn, for the Princeton Patagonian Expedition, generously supported by Mr. J. Pierrepont Morgan, after whom the species is named.

Akodon tucumanensis, sp. nov.

Type, No. 0-7-9-13, British Museum, ♀ adult, Tucuman, Argentina, alt. 450 m., June 29, 1899; coll. L. Dionelli.

Pelage very soft and full. Above dull ruddy brown, darker and more reddish than in *A. xanthorhinus*, minutely grizzled with black-tipped hairs, darkest over the back, lighter on the sides; sides of nose rather lighter, but not very distinctly different from the front of the head, in this differing from the *A. xanthorhinus-canescens* group; below buffy gray varying to strong buff; ears small, dark brown, edged within with buffy brown hairs; feet dusky gray above, soles of hind feet dusky brown; tail indistinctly bicolor, very thickly haired; blackish brown above, sides and below lighter, pale buffy gray.

Measurements.—Total length (type), 140.5 mm.; head and body, 81; tail, 59.5; hind foot, 17.5; ear 15. Three adults (2 males and 1 female) give the following: Total length, 136.8 (130–140.5); head and body, 77.8 (70–82.5); tail, 59 (57.5–60); hind foot, 17.8 (17–19); ear, 12.6 (12.5–15).

The skull presents no differences except those of size from its near congeners. Total length (type), 24; basilar length, 18; zygomatic breadth, 12; greatest width of brain case, 11.2; interorbital breadth, 5.2; nasals, 8; palate, 3; palatal foramina, 5.5; upper toothrow, 4.

Akodon tucumanensis belongs to the small-sized, soft-furred, short-tailed, small-eared, short-nosed group of which *A. olivaceus*, *A. xanthorhinus*, and *A. canescens* are typical representatives and its nearest allies, from which, however, it is strongly distinct in features of coloration. It is smaller than *olivaceus*, agreeing very nearly in size with *A. canescens* and *A. xanthorhinus*. It is thus far represented by only the three specimens above mentioned, all taken at Tucuman, June 29, July 1, and July 24, 1899, by Mr. L. Dionelli.

***Metachirus nudicaudatus bolivianus*, subsp. nov.**

Type, No. 1-6-7-73, British Museum, ♀ ad., Chulumani, Yungas, Bolivia, alt. 2000 m., Feb. 14, 1901; P. O. Simons.

Above pale yellowish gray, strongly varied with black, the black most developed along the median line, giving the effect of a blackish dorsal area, which, in some specimens, takes the form of a quite distinct black median line; sides paler, more fulvous and less blackish; below pale buff, this color extending well up on the sides and on the outer edge of thigh and hind leg. Head black, slightly varied with gray along the frontal region and top of the nose; a broad black stripe extends from the whiskers to the base of the ear, enclosing the eye, and crossing over the head in front of the ears to join the blackish median band on the head; eye-spots ochraceous; feet dull yellowish gray brown, palms brownish flesh color, soles dusky; ears pale brown; tail brown for about the basal two-thirds, the apical portion whitish.

Measurements.—Type: Total length, 498 mm.; head and body, 225; tail, 273; hind foot, 40; ear, 38. A series of 6 specimens, 3 males and 3 females, measure as follows:

B. M. No.	Sex.	Head and body.	Tail.	Hind foot.	Ear.
1-6-7-71	♂	240	298	43	38
1-6-7-69	♂	243	308	42	38.5
1-6-7-70	♂ juv.	195	253	39	36
1-6-7-73	♀	225	273	40	38
1-6-7-74	♀	240	290	41	39
1-6-7-72	♀	238	300	42	38

Skull.—Type (young adult ♀): Total length, 54; basal length, 51; length of nasals, 27.5; width of nasals, 9×3.7 ; zygomatic breadth, 28; mastoid breadth, 16.5; interorbital breadth, 9.5; palatal length (from inner base of incisors), 30; breadth at m^4 , outside, 18; inside, 11; upper toothrow, 19.5; m^{1-4} , 11.

No. 1-6-7-72, ad. ♀ with worn teeth: Total length, 55; basal length, 52; length of nasals, 29; width of nasals, 9×4 ; zygomatic breadth, 28; mastoid breadth, 17; interorbital breadth, 9.5; palatal length, 31; upper toothrow, 20; m^{1-4} , 11.5.

Young.—Young examples, one-tenth to one-fourth grown, similar to adults in general coloration, but in the very young with a strongly marked black dorsal stripe, the cheeks and eye-spots brighter, approaching ochraceous buff.

Metachirus bolivianus belongs to the *M. nudicaudatus* group, but differs from all previously described members of it in the blackish variegation of the back, black-tipped hairs being not only a conspicuous feature of the dorsal coloration, but give in some specimens the prevailing tone, especially to the median area, which shows often a tendency to a distinct black median band, which in the young appears as a distinct, sharply defined line, wholly absent in young of corresponding age in *M. nudicaudatus* (Guiana specimens) and in *M. nudicaudatus colombica* (from near Bogota). It also differs from the other forms in the paler coloration of the sides and abdomen, outside of thighs, and eye-spots, with consequently greater contrast between the coloration of the dorsal and ventral surfaces. The black of the dorsal surface is about as in the *M. opossum* group, but with a pale yellowish gray color instead of a clear gray. Apparently its nearest ally is *M. nudicaudatus phæurus* Thomas from northern Ecuador (type and only specimen, 1-3-19-44, ♂ ad., May 19, 1900, St. Javier, N. Ecuador, alt. 60 feet; G. Flemming). The type of the latter is in short velvety pelage with a broad, ill-defined dusky median area and a wholly dark tail. This form corresponds to the dark form—*tschudii*—of the *M. opossum* group from Peru.

This subspecies is based on a series of 11 specimens, collected by P. O. Simons at Chulumani, Bolivia, of which 5 are young of various ages (2 nurslings, 2 apparently just old enough to shift for themselves, and 1 about two-thirds grown) and 6 fully adult. The series is very uniform in coloration, though varying a little in the amount of black on the back, except that the two very young specimens have the black median stripe more distinct than the older examples.

(Continued from 4th page of cover.)

Vol. II. Anthropology (continued).

Jesup North Pacific Expedition.

PART IV.—The Thompson Indians of British Columbia. By James Teit.
Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, with 198 text figures.
April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand.
Pp. 393-399, pll. xxi-xxiii, with 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith.
Pp. 401-442, pll. xxiv-xxvi, with 51 text figures. June, 1900. Price, \$2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228,
pll. i-iv, with 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp.
1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith
and Gerard Fowke. Pp. 55-75, pll. i-v. January, 1901. Price, \$1.50.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part
I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.	Price, \$5.00	Volume VIII, 1896.	Price, \$4.00
" II, 1887-90.	4.75	" IX, 1897.	4.75
" III, 1890-91.	4.00	" X, 1898.	4.75
" IV, 1892.	4.00	" XI, Part I, 1898.	1.25
" V, 1893.	4.00	" " II, 1899.	2.00
" VI, 1894.	4.00	" XII, 1899.	4.00
" VII, 1895.	4.00	" XIII, 1900.	4.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued monthly, from October to May, inclusive,—eight numbers a year. Price, 75 cents a year, 10 cents a number.

For sale by G. P. PUTNAM'S SONS, New York and London ;

J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, with 15 text figures. October 25, 1899.

PART V.—A Skeleton of *Diplodocus*. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, with 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, with 117 text figures. May 1899. Price \$2.00.

(Continued on 3d page of cover.)

*Zimmermann's 'Zoologiæ Geographicæ'
and 'Geographische Geschichte' Con-
sidered in their Relation to Mamma-
lian Nomenclature.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XVI, ARTICLE II, pp. 13-22.

New York, Feb., 1, 1902.

LIST OF ANTHROPOLOGICAL PAPERS FROM THE BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

	PRICE
A Table of the Geographical Distribution of American Relics in a Collection exhibited in the American Museum of Natural History, with Explanatory Text, by A. E. Douglass (Vol. VIII, 1896). 22 pp.	\$0.75
The Temple of Tepoztlan, Mexico, by M. H. Saville (Vol. VIII, 1896). 6 pp., 5 pl.	.50
A Rock Painting of the Thompson River Indians, British Columbia, by James Teit, edited by Franz Boas (Vol. VIII, 1896). 4 pp.	.30
The Decorative Art of the Indians of the North Pacific Coast, by Franz Boas (Vol. IX, 1897). 54 pp.	.75
An Ancient Figure of Terra Cotta from the Valley of Mexico, by M. H. Saville (Vol. IX, 1897). 4 pp., 2 pl.	.40
The Huichol Indians of Mexico, by Carl Lumholtz (Vol. X, 1898). 14 pp., 2 pl.	.50
Marked Human Bones from a Prehistoric Tarasco Indian Burial-Place in the State of Michoacan, by Carl Lumholtz and Aleš Hrdlička (Vol. X, 1898). 20 pp., 5 pl.	.60
Description of an Ancient Anomalous Skeleton from the Valley of Mexico, with Special Reference to Supernumerary and Bicipital Ribs in Man, by Aleš Hrdlička (Vol. XII, 1899). 28 pp., 5 pl.	.50
The Eskimo of Smith Sound, by A. L. Kroeber (Vol. XII, 1899). 64 pp., 4 pl.	.80
Symbolism of the Arapaho Indians, by Alfred L. Kroeber (Vol. XIII, 1900). 16 pp.	.25
A Shell Gorget from the Huasteca, Mexico, by Marshall H. Saville (Vol. XIII, 1900). 6 pp.	.25
An Onyx Jar from Mexico, in Process of Manufacture, by M. H. Saville (Vol. XIII, 1900). 4 pp., 1 pl.	.30
Cruciform Structures near Mitla, by Marshall H. Saville (Vol. XIII, 1900). 18 pp., 10 pl.	1.00
A Bilateral Division of the Parietal Bone in a Chimpanzee, with a Special Reference to the Oblique Sutures in the Parietal, by Aleš Hrdlička (Vol. XIII, 1900). 16 pp.	.30
A Bronze Figurine from British Columbia, by Franz Boas (Vol. XIV, 1901). 2 pp., 1 pl.	.25
A. J. Stone's Measurements of Natives of the Northwest Territories, by Franz Boas (Vol. XIV, 1901). 16 pp., 5 pl.	.80
The Eskimo of Baffin Land and Hudson Bay, by Franz Boas (Vol. XV, 1901). 370 pp., 4 pl.	3.00
Basketry Designs of the Indians of Northern California, by Roland B. Dixon (Vol. XVII, 1902). 32 pp., 37 pl.	1.50

Article II.—ZIMMERMANN'S 'ZOOLOGIÆ GEOGRAPHICÆ' AND 'GEOGRAPHISCHE GESCHICHTE' CONSIDERED IN THEIR RELATION TO MAMMALIAN NOMENCLATURE.

By J. A. ALLEN.

There seems to be a difference of opinion as to whether Zimmermann's 'Zoologiæ Geographicae'¹ is citable as an authority in questions of nomenclature. Most systematic mammalogists appear to have ignored it altogether, but recently Mr. C. I. Forsyth Major has taken it as authority for a name applied to a West Indian species of Muridæ,² where he cites "*Castor piloris* Zimmermann, Zool. Geogr. 509 (1777)," for the animal named *Mus pilorides* by Desmarest in 1826.

Zimmermann's two works, the 'Zoologiæ Geographicae' and the 'Geographische Geschichte,' are constructed on nearly the same general plan; the first is in Latin, the other in German. The latter, however, is not merely a German translation of the first, but an essentially different work.³

Zimmermann was one of the best mammalogists of his time, as regards his familiarity with the literature of the subject, and discriminating and conservative,—far more so than many of his contemporaries and successors. But as regards nomenclatural form he was not a model, even for his day, in this respect falling behind his contemporary Schreber, and being much more lax than Pallas and Erxleben. In both works Zimmermann, although binomial as regards technical names, often employed vernacular names only, for genera as well as species, even when defining them by a formal diagnosis; while in the case of species he was apt to cite the names given by previous writers as these authors used them, regardless of whether the generic element of the name conformed

¹ The full title is as follows:

Specimen | Zoologiæ Geographicae, | Quadrupedum | domicilia et migrationes | sistens. Dedit, Tabulamque Mundi Zoographicam adjunxit | Eberh. Aug. Guiljelm. Zimmermann, | Professor Mathes. et Phys. Collegii | Carolini Brunsvicensis | — | [=quotation from Pliny, 3 lines]— | Lugduni Batavorum, | Apud Theodorum Haak, et Socios. | MDCCLXXVII.—1 volume, 4to, pp. xxiv + 686, and map.

² Ann. and Mag. Nat. Hist. (7), VII, Feb., 1901, p. 206.

³ "Auf diese Weise ist dies gegenwärtige Buch allerdings eine Originalschrift, die mit dem lateinischen nur einen gleichen Plan hat."—Zimmermann, Geogr. Gesch., I, Vorrede, [p. ii].

or not with his own genera. In both works, but especially in the 'Geographische Geschichte,' he employed, when using technical nomenclature, the binomial method in due form, and in each work named a number of species supposed by him to be new, in a perfectly citable manner.

The greater part of the second volume of the 'Geographische Geschichte' is devoted to a 'Verzeichniss aller bekannten Quadrupeden,' in which, following Pennant, he divided the Quadrupeds into four 'orders' (some of them with subdivisions), 44 genera, and 388 species (consecutively numbered from 1 to 388), with a large number of additional forms entered as "Unbestimmtere Arten." His treatment is thus taxonomically methodical. In the earlier work he followed closely the arrangement of Linnæus as given in the twelfth edition of the 'Systema Naturæ.'

In his later work he singularly ignores the new names he gave in his earlier work, adopting those of Erxleben instead of his own, even where Erxleben's names are of the same date, and in general following closely the nomenclature of Pallas and Erxleben.

While the 'Geographische Geschichte' has been cited by many subsequent systematic writers, especially by J. B. Fischer in his 'Synopsis Mammalium,' and the new names adopted when having priority, the 'Zoologiæ Geographicæ' has been as uniformly neglected, although careful scrutiny shows that both are equally entitled to recognition. In the 'Zoologiæ' rather more new names were given than in the later work, but when not synonyms of earlier names they in most cases conflict with names given by Erxleben in his 'Systema Regni Animalis,' with the result that Erxleben's names have been adopted while Zimmermann's have been overlooked. Fortunately for science, both authors often gave the same name to the same species, so that the uncertainty relates to the citation of the authority for the name rather than to the name itself. The explanation of this coincidence in names is generally obvious, the species having been based on the same sources of information, which in most cases suggested the names bestowed independently by the two authors.

As evidence that the two works were issued simultaneously, in addition to the date they each bear, neither author cites the other, while Zimmermann in his second and later work not only cites Erxleben constantly, but adopts his nomenclature, even, as already said, where it conflicts with that of the '*Zoologiæ Geographicae*.' Besides, both authors cite Schreber's '*Säugethiere*' to about the same point.

In deciding what names are to be construed in a vernacular sense and what in a technical sense, in the case of the '*Zoologiæ*,' great aid is rendered by Zimmermann's index to the work, which appears to have been prepared with care, and which apparently clearly distinguishes whether a name is employed in a vernacular or in a technically nomenclatural sense. Further aid is furnished by the key to his map.

The '*Zoologiæ Geographicae*' is divided into four chapters, each treating of different aspects of the general subject. Chapter III is systematic and corresponds to the '*Verzeichniss*' portion of Volume II of the '*Geographische Geschichte*,' although some new names are given in other parts of the work.

Following is a list of the new binomial names appearing in both of Zimmermann's works, with their recognized equivalents. Those in current use, or entitled to adoption, are distinguished by being printed in heavy-faced type.

I. '*ZOOLOGIÆ GEOGRAPHICÆ*.'

Dama virginiana (pp. 351 (in text) and 532, index, and map)=[*Cervus dama*] *americanus* *Erxleben*, 1777 (if Erxleben's name be citable) =*Cervus virginianus* *Boddaert*, 1784. As shown by Zimmermann's *Geogr. Gesch.*, II, 1780, p. 129, the name is adopted from Ray, and is based on Lawson and Pennant. (See further remarks on this question below, p. 18).

Bos gnou (p. 372)=*Antilope gnou* *Zimmermann*, 1780 (*Geogr. Gesch.*, II, p. 102)=*Connochetes gnou* (*Zimm.*).

Viverra fossana (p. 385, footnote); indexed as *Fossana*. =*Viverra fossa* *Schreber*, pl. CXIV, 1776 (plate name).

Vespertilio canadensis (p. 457)=*Vespertilio borealis* *Müller*, 1776=*Vespertilio noveboracensis* *Erxleben*, whose name Zimmermann adopts in *Geogr. Gesch.*, II, 1780, p. 418.

Dasypus duodecim-cingulus (p. 467)=*Dasypus duodecimcinctus* *Schreber*, 1776 (plate name).

- Tigris fulva* (p. 479) = *Felis concolor* Linn.
Tigris jaguarete (p. 480; indexed only as *jaguarete*) = *Felis nigra* Erxleben, 1777, whose name Zimmermann adopted in 1780.
Viverra izquepatl (p. 483) = *Viverra vulpecula* Erxleben, 1777 = *Viverra memphitis* Linn.
Viverra chinche (p. 484) = *Viverra mephitis* Schreber, 1776 (not *Viverra memphitis* Linn.).
Lutra brasiliensis (p. 485) = *Lutra brasiliensis* Zimmermann, 1780.
Mustela voang-shire (p. 487) = *Mustela galera* Erxleben, 1777.
Mustela javanica (p. 488) = *Mustela javanica* Zimmermann, 1780 = ?
Herpestes javanica E. Geoffroy, 1812.
Mustela quoll (p. 489) = ?
Ursus albus (p. 489) = *Ursus maritimus* Phipps, 1774.
Talpa flava (p. 496) = *Talpa europæa*, γ *flavescens* Erxleben, 1777 = *Sorex aquaticus* Linn.
Talpa caudata (p. 497) = *Talpa longicaudata* Erxleben, 1777 = *Sorex aquaticus* Linn.
Talpa fusca (p. 497) = *Talpa fusca* Kerr, 1792 = *Sorex aquaticus* Linn.
Talpa rubra (p. 497) = *Talpa rubra* Erxleben, 1777.
Sorex brasiliensis (p. 508) = *Sorex americanus* Müller, 1776 = *Sorex brasiliensis* Erxleben, 1777 = *Peramys americanus* (Müller).
Cavia javensis (p. 507) = *Mus leporinus* Linn.
Cavia akouchi (p. 508) = *Cavia acouchy* Erxleben, 1777.
Sciurus purpureus (p. 518) = *Sciurus indicus* Erxleben, 1777.
Sciurus versicolor (p. 520) = *Sciurus variegatus* Erxleben, 1777.
Sciurus mexicanus (p. 521) = *Sciurus mexicanus* Erxleben, 1777.
Yerboa gigantea (p. 526) = *Jaculus giganteus* Erxleben, 1777 = *Macropus giganteus* (Zimm.) auct.
Moschus meminna (p. 530) = *Moschus meminna* Erxleben, 1777 = *Tragulus meminna* (Erxl.).
Tragulus surinamensis (p. 530) = *Moschus americanus* Erxleben, 1777.
Cervus porcinus (p. 532); usually attributed to Zimmermann at 1780.
Cervus (vel *potius*) *Capreolus mexicanus* (p. 533) = *Cervus mexicanus* Gmelin, 1788. Referred by Zimmermann in 1780 to *Cervus bezoarticus* Linn. 1758, which has in part the same original basis (Hernandez) as *Cervus mexicanus* Gmelin.¹

¹ *Cervus bezoarticus* Linn. was based on the "Mazama" of Hernandez, or rather on Hernandez's "Cap. XIV. De Mazama, seu Cervus" collectively and not on any particular species of the several treated under this caption, and is thus in such a way composite as to be beyond satisfactory restriction by the process of elimination, and is further complicated by references to South American species of deer mentioned by Marcgrave and Piso. The name is therefore unavailable in nomenclature, and cannot properly be assigned to the South Brazilian and Paraguayan *Cervus campestris* F. Cuvier, as has recently been done by Lydekker (*Deer of All Lands*, 1898, p. 287).

Cervus mexicanus, of both Zimmermann and Gmelin, was based on Pennant's "Mexican Deer" (including Pennant's citations). Pennant's first reference is to the Tuethlalamacama of Hernandez, which Hernandez says was also called Berendo by the natives of Mexico. This animal, under both these names, is commonly and apparently correctly

Antilope leucopus (p. 541) = *Antilope pictus* Pallas, 1777 = *Antilope tragocamelus* PALLAS, 1776 = *Boselaphus tragocamelus* (Pall.).

Antilope tzeiran (p. 543) = *Antilope gutturosa* Pallas, 1777 = *Gazella gutturosa* (Pall.).

Antilope koba (p. 545) = *Antilope koba* Erxleben, 1777 = ?*Antilope korrigum* Ogilby, 1836.

Mus oeconomus (p. 668) = *Mus oeconomus* Pallas, 1778 = *Microtus oeconomus* (Zimm.).

The Pisoris, or Rat musqué of Rochefort, and the Potto are omitted from the above list as not being binominally named.

In addition to the above list of specific names there are four superspecific names which require consideration in reference to their tenability as designations for genera. These are *Marmotta* (p. 509), *Jerboa* (p. 522), *Dama* (p. 532), and *Capreolus* (p. 533).¹

In treating of the *Mures* Zimmermann divided the genus *Mus* into two sections, "A. *Marmotta*," and "B. *Mures proprie sic dicti*." Under *Marmotta* he placed three species only, namely, (1) *Mus marmota* Linn., (2) *Mus monax* Linn., and (3) *Mus citellus* Linn., all Sciuromorphs. Under the second section he placed 26 species, all Murine except No. 26, the *Sciurus striatus* Linn.

To this extent his classification is an improvement on that of Linnæus. It is also to be noted that his use of *Marmotta* for a superspecific group carries back the name from Blumenbach (1799) to a date (1777) three years prior to the introduction of *Arctomys* (Schreber, 1780) for practically the same group.

Jerboa, named on page 522, and accompanied by a formal diagnosis, includes five species of which the first three are Dipodine, the first being *Mus jaculus* Linn. *Jerboa* is almost the exact equivalent of *Jaculus* Erxleben, of the same date, even to the inclusion of the Giant Kangaroo (*Macropus*) by both authors. The constituents of the two are found, on

identified with the Mexican form of the Pronghorn (*Antilocapra americana*). As Pennant's description scarcely applies at all to this animal, but is a vague conglomeration of references to various species of deer, with a figure of malformed antlers from an unknown locality, the name *Cervus mexicanus* of Zimmermann and Gmelin is clearly untenable in nomenclature.

¹ See below for remarks on *Dama* and *Capreolus*.

analysis, to differ in the inclusion by Zimmermann of the Tarsier, which is omitted by Erxleben. *Jerboa* also is practically equivalent to *Yerboa* of Forster, 1778, and of *Dipus* Schreber, 1782, the type by elimination being in each case the same, *Mus jaculus* Linn.

Of the 33 new specific names published in the 'Zoologiæ Geographicae,' four of the accepted names are accredited to Zimmermann's later 'Geographische Geschichte' and one to Pallas;¹ 17 (including a number of Zimmermann-Erxleben names) are synonyms of earlier names given by Schreber, Müller, Pallas, and Phipps, and three others are not identifiable. The remaining eight names are of even date with names given by Erxleben to the same species, five of them being identical with Erxleben's names and three different.

The question now arises, What is to be done with the rival tenable Zimmermann-Erxleben names? A comparison of the two works shows that in each case they have practically the same basis, the same date, and equal claims to recognition. As Erxleben's names have long been current, while Zimmermann's have been overlooked, there is no reason for now giving Zimmermann preference over Erxleben, except where Erxleben's names are of doubtful tenability, as in the case of the Virginia Deer considered below. This disposes of the case of *Jerboa* vs. *Jaculus*, as well as the rival specific names.

Some of Zimmermann's other names, however, seem to call for special remark, namely, his *Dama virginiana* and his "Piloris," as well as his use of the names *Dama* and *Capreolus*.

DAMA VIRGINIANA Zimmermann.

Zimmermann, in treating of the Virginia Deer of Pennant in Section VII of his Cap. II (p. 351), claims its specific distinctness from *Cervus dama* of Linnæus, and refers to it in the body of the text as "*dama virginiana*," in possibly a non-nomenclatural sense; but in Section X of Cap. III, where in § III (pp. 531-535) he treats systematically the genus "*Cervus* Linn.," and

¹ These five names do not include the case of *Dama virginiana*, which is specially considered below.

divides the genus into two sections, "a. *Cornibus palmatis*," and "b. *Cornibus teretibus*," placing *Cervus alce*, *C. tarandus*, and *C. dama* in the first division and *Dama virginiana* and the other deer then known in the second division, the name *Dama virginiana* is published in proper binomial form, and is based exclusively on the "Virginian Deer" of Pennant (Synopsis, 1771, p. 51, pl. ix, fig. 2). It appears also in the index as a technical binomial name, and on his map, where in the 'Notarum' it stands as *Dama virginiana*, and is engraved on the map (over what is now western Pennsylvania) as *Dama virg.* He also employs it in his later 'Geographische Geschichte' (Vol. II, 1780, p. 129), where it is credited to Ray. Thus the long-current specific name for the Virginia Deer is carried back from Boddaert (1784) to Zimmermann (1777). That it should take precedence over Erxleben's "Differtne vere *americanus* uti Pennanto videtur?" (Syst. Regni Anim., 1777, p. 312), which some recent writers have brought into question as the earliest available specific name for the Virginia Deer, is beyond reasonable challenge. As I have claimed (Am. Nat., XXXIV, 1900, p. 318), Erxleben did not name, nor did he intend to name, the Virginia Deer in this interrogative phrase. Even Zimmermann in his 'Verzeichniss,' where he so scrupulously adopted all of Erxleben's names, even at the sacrifice of his own of even date with Erxleben's, did not cite Erxleben in this connection, for the evident reason that he did not consider that Erxleben had named the animal.

What, now, is the status of *Dama* as used consistently and repeatedly by Zimmermann, as the generic designation of the Virginia Deer? If tenable from Zimmermann it would long antedate *Odocoileus*, and all other generic names applied to the Virginia Deer and its allies. Other now current generic names have quite as slight a basis; and any author who would take *americanus* from Erxleben as the specific name of the Virginia Deer could not very consistently reject *Dama* as the generic name of the group. As shown above, Zimmermann evidently used *Dama* in a generic sense, with intent, for the Virginia Deer; even those who may question his intention

in the matter must admit that his use of it fulfills the nomenclatural requirements of the case. It therefore seems as necessary to accept *Dama* in place of *Odocoileus* as it does to reject *americanus* Erxleben for the specific name of the Virginia Deer, which should evidently stand as *Dama virginiana* Zimmermann.

Taking as a basis Miller and Rehn's recent list of the *Odocoileus* group (Proc. Boston Soc. Nat. Hist., Vol. XXX, No. 1, pp. 14-17, Dec., 1901), and including recent additions, the North American forms of the genus, under the above and a few other changes of nomenclature, will stand (adopting an alphabetic sequence) as follows:

- | | |
|--------------------------------------|------------------------------------|
| 1. <i>Dama acapulcensis</i> (Caton). | 15. <i>Dama leucura</i> (Doug.). |
| 2. " <i>cerrosensis</i> (Merriam). | 16. " lichtensteini , nom. |
| 3. " <i>columbiana</i> (Rich.). | nov. ¹ |
| 4. " <i>c. schaphiotus</i> (Merr.). | 17. " <i>nelsoni</i> (Merr.). |
| 5. " <i>c. sitkensis</i> (Merr.). | 18. " <i>thomasi</i> (Merr.). |
| 6. " <i>costaricensis</i> (Miller). | 19. " <i>tolteca</i> (Sauss.). |
| 7. " <i>couesi</i> (C. and Y.). | 20. " <i>truei</i> (Merr.). |
| 8. " <i>crooki</i> (Mearns). | 21. " <i>virginiana</i> Zimm. |
| 9. " <i>hemionus</i> (Raf.). | 22. " <i>v. borealis</i> (Miller). |
| 10. " <i>h. californica</i> (Caton). | 23. " <i>v. louisianæ</i> (G. M. |
| 11. " <i>h. cana</i> (Merr.). | Allen). |
| 12. " <i>h. eremica</i> (Mearns). | 24. " <i>v. macroura</i> (Raf.). |
| 13. " <i>h. peninsulæ</i> (Lyd.). | 25. " <i>v. osceola</i> (Bangs). |
| 14. " <i>h. virgulta</i> (Hallock). | 26. " <i>v. texensis</i> (Mearns). |

In this connection the use of the name *Capreolus*, in a generic sense, for *Cervus mexicanus* Gmelin et auct., also requires mention, as there is no doubt of its pertinence to the *Odocoileus* group. As, however, it occurs one page later than *Dama* in Zimmermann's work, it must give place to *Dama*, although suggested as a preferable substitute for *Cervus* for Pennant's Mexican Deer. It is also untenable on account of its exclusive relation to an unidentifiable and therefore invalid species. (See footnote to p. 16.)

PILORIS, OR THE RAT MUSQUÉ OF ROCHEFORT.

As noted at the beginning of this article, Mr. Forsyth Major has ascribed the name "*Castor piloris*" to Zimmer-

¹ = *Cervus mexicanus* Lichtenstein, but not *Cervus mexicanus* of Zimmermann nor Gmelin. Lichtenstein's name being preoccupied, his *Cervus mexicanus* may be called *Dama lichtensteini*.



mann. That Zimmermann did not name the animal *Castor piloris*, but simply called it "Piloris," in a non-technical sense, is evident from his index where it is entered as *Piloris*, and not as *Castor piloris*, and from his general method of using names in Cap. III of the 'Zoologiæ Geographica.' Besides, in the 'Geographische Geschichte' (II, p. 360) he refers the Rat musqué of Rochefort to *Mus pilorides* Pallas. If the name *Mus pilorides* given to this animal by Desmarest in 1826 is preoccupied by *Mus pilorides* Pallas, 1786, as seems to be the case, the proper name of the Rat musqué, or *Piloris*, will be *Mus desmaresti* of Fischer, 1829, = *Megalomys desmaresti* (Fischer), or *Oryzomys desmaresti* (Fischer) for those who believe, with Mr. Forsyth Major, that *Megalomys* is not separable from *Oryzomys*.

II. THE 'GEOGRAPHISCHE GESCHICHTE.'

During the interval of three years between the publication of the 'Zoologiæ Geographica' and Vol. II of the 'Geographische Geschichte' quite a number of new mammals were indicated in the works of travellers and other non-technical writers to which Zimmermann gave names in his later work. It is also to be noted that he displayed superior astuteness over Erxleben in separating several species not recognized by the latter. His discrimination is further evinced through his treatment of many forms as "Unbestimmtere Arten," which he merely enumerated without either naming or giving them numbers.

The species newly named or renamed in the present work (all in Vol. II except the last) appear to be the following, in the order of their position in the work. Those at present recognized in nomenclature are indicated by heavy type.

Bos moschatus (Vol. II, p. 86) = *Ovibos moschatus* (Zimm.).

Cervus muntjak (p. 131) = *Cervulus muntjak* (Zimm.).

Tapir anta (p. 154) = *Hippopotamus terrestris* Linn. = *Tapirus terrestris* (Linn.).

Simia madarogaster (p. 176) = *Simia maimon* Linn.

Papio æthiops (p. 180) = ?; not *Simia æthiops* Linn.

Cercopithecus kephalopterus (p. 185) = *Semnopithecus cephalopterus* (Zimm.) auct.

Cercopithecus mulatta (p. 195) = ?

Simia porcaria (p. 197) = ?; probably not *Simia porcaria Hasselquist*, 1762.

Cebus polykomos (II, p. 202, III, p. 272) = *Colobus polykomos* (Zimm.); the name is usually ascribed to "Schreber" or Illiger.

Lemur lori (p. 211) = *Nycticebus tardigradus* (Linn.).

Didelphis karkinophaga (p. 226).

Didelphis kenguru (p. 231) = *Yerboa gigantea Zimm.*, 1777 = *Macropus giganteus* (Zimm.) auct.

Canis zerda (p. 247) = *Fennecus zerda* (Zimm.).

Viverra manguste (p. 286) = *Viverra ichneumon Linn.*

Lutra [misprint for *Lutra*] **minima** (p. 317) = *Chironectes minima* (Zimm.).

Cavia patagonum (p. 328) = *Cavia patagonica Shaw*, 1801 = *Dolichotis patagona* (Zimm.).

Sciurus inauris (p. 344) = *Myoxus inauris Zimmermann*, III, 1783, 275, based on Earless Dormouse, Pennant, II, p. 426 = ? *Myoxus africanus Shaw*, 1801 = ? *Myoxus capensis F. Cuvier*, 1829.

Myoxus chrysurus (p. 352) = *Loncheres chrysurus* (Zimm.) = *Echimys cristatus Desm.*, 1817.

Dipus hudsonius (p. 358) = *Zapus hudsonius* (Zimm.).

Sorex minutissimus (p. 385) = *Sorex minimus Linn.*

Sorex surinamensis (p. 386) = *Surinamische Spitzmaus* of Schreber = *Sorex surinamensis Gmelin*, 1788 = *Peramys brevicaudatus (Erxl.)*.

Erinaceus tendrac (p. 393) = *Ericulus setosus (Schreber, 1778)*, plate name.

Erinaceus tanrec (p. 394) = *Centetes ecaudatus (Schreber, 1778)*, plate name.

Manati gigas (p. 426) = *Rhytina gigas* (Zimm.). The generic name *Manati* is of even date with *Manatus* Storr.

Antilope marsupialis (p. 427) = *Antilope euchore Zimmermann* (ex Forster MS.), *Geog. Gesch.* III, 1783, 269 = *Antidorcas marsupialis* (Zimm.). As the authors of 'The Book of Antelopes' (Vol. III, 1897-98, p. 58) freely admit, the name *marsupialis* has three years' priority over *euchore*, however unfortunate the fact.

Phoca fasciata (III, 1783, p. 277) = *Histiophoca fasciata* (Zimm.).

Of Zimmermann's 26 new names 12 are in current use, and one other clearly has priority; of the remaining 13, three are not readily identifiable, and the remaining 10 are synonyms of earlier names given by Linnæus, Schreber, and Erxleben. Thus 23 of Zimmermann's 26 new names are identifiable—a pretty favorable commentary on the character of his work and standing as a naturalist.

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. (In press.)

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. (In press.)

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. (In press.)

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	4.75	" " " II, 1899 " "	2.00
" III, 1890-91.....	4.00	" " " III, 1900 " "	2.00
" IV, 1892.....	4.00	" " " IV, 1901 " "	1.75
" V, 1893.....	4.00	" " " (Complete). " "	5.00
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00	" XIII, 1900.....	4.00
" VIII, 1896.....	4.00	" XIV, 1900.....	4.00
" IX, 1897.....	4.75	" XV, Part I, 1901 " "	3.00
" X, 1898.....	4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Tesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A FURTHER NOTE ON THE GENERIC NAMES
OF THE MEPHITINÆ.

BY J. A. ALLEN.

A few months ago Mr. Arthur H. Howell, in his 'Revision of the Skunks of the Genus *Chincha*,'* proposed to substitute the name *Chincha* Lesson, 1842, for the group of Skunks which had previously for a century been known as *Mephitis* Cuvier (1800), and to transfer the name *Mephitis* to the group which for thirty-six years had been known as *Spilogale* (Gray, 1865). The basis for this transfer seeming to me invalid, I soon after gave my reasons for this belief in a paper entitled 'The Generic Names of the Mephitinæ.'† Mr. Howell, in a recent article entitled 'The Generic Names of North American Skunks,'‡ endeavors to justify his action in regard to the case of *Chincha*, and also in reference to several minor points respecting which we hold different opinions. Fortunately, or unfortunately, these disputed points nearly all hinge on a wretched plate published by Catesby in 1731, and an equally inaccurate and vague

*North American Fauna, No. 20, August 31, 1901.

†Bull. Am. Mus. Nat. Hist., XIV, pp. 325-334, Nov. 12, 1901.

‡Proc. Biol. Soc. Washington, XV, pp. 1-9, with a plate, Feb. 18, 1902.

description of an animal he called *Putorius americanus striatus*, which became in 1758 the chief basis of Linnæus's *Viverra putorius*. This name, with a quasi-fictitious basis, as has been recognized by all modern writers on the Skunks, having been introduced into systematic literature naturally held its place in the writings of a long list of later indiscriminate compilers, but which has been almost as uniformly rejected by more critical students as having no justifiable basis.

As Catesby's description and plate, and more especially the latter, are the basis of the present controversy it may be well to compare, in parallel columns, Mr. Howell's opinion and mine as to how such a gross caricature of nature could have originated.

ALLEN, Nov. 1901.

"As stated by Bangs....., it [Catesby's *Putorius americanus striatus*] is composite, being apparently 'a combination of *Mephitis mephitis* and *Spilogale ringens*.' Catesby's figure, however, has little resemblance to either, and may fairly be considered as drawn off-hand from a confused recollection of these two animals, and hence factitious. (*L. c.*, p. 326, 327.) ".....they [Catesby's figure and description] must have been based, to take the most charitable view of the case, on a confused recollection of the little spotted skunk and the common skunk, and not on any animal he ever met with in nature." (*L. c.*, p. 333.)

HOWELL, Feb. 1902.

"Although neither the figure nor the description furnishes an accurate portrayal of either of the two skunks inhabiting the region where he [Catesby] travelled, the reference of both plate and description to *Spilogale* seems unquestionable....." (*L. c.*, p. 3.)

"When we consider that Catesby's drawing was probably made from his recollection of an animal seen afield, perhaps at some distance, and probably in the dusk of twilight, the differences between the figure and the real animal become unimportant. It must be remembered that it is not necessary to show that his figure is a correct representation of a *Spilogale*: the question is simply, could it have been based on anything else?...." (*L. c.*, pp. 3 and 4.)

As shown above, Mr. Howell admits that Catesby's figure and description do not "accurately" portray either of the two skunks of North Carolina, and that the "drawing was probably made from his [Catesby's] recollection of an animal seen afield

perhaps at some distance, and probably in the dusk of evening;" which is equivalent to my statement that the drawing was made off-hand from a confused recollection of the two animals. Thus far Mr. Howell's opinion and estimate of the value of Catesby's description and figure are in perfect agreement with my own. But he assumes, nevertheless, that both "unquestionably" relate to *Spilogale*, and on this assumption, as already said, his contention and conclusions solely rest; while I claim that they represent nothing in nature and that any names based on them by later systematists have no standing in nomenclature and should be treated as though they had no existence. This leaves Cuvier's genus *Mephitis*, as originally constituted, a monotypic group, unless we admit Kalm's description of his Pennsylvania skunk as affording a basis for a second species, in which case the two species admitted by Cuvier are strictly congeneric, the genus containing no element of *Spilogale* or *Conepatus*, and hence is not open to restriction.

Mr. Howell has made a most welcome and valuable contribution to the controversy by illustrating his paper with a reduced copy of Catesby's figure, and giving with it, on the same plate for comparison, illustrations of typical examples of *Mephitis* and *Spilogale* from the region in question. Catesby's animal, with five long, narrow, white stripes running the entire length of the body and one of them continued far down on the tail, and its otherwise wholly black tail, as long as the body, broad, bushy, and without a white tip, and the two light stripes on the head, is sufficiently in contrast with either form of the skunk to warrant both Mr. Howell's and my own statement that it is essentially a figment of Catesby's imagination or a fabrication based on a treacherous memory. It was deserving of serious consideration only in the early days of zoology, during the middle and latter part of the eighteenth century, when traveller's tales and the crude observations of unscientific writers formed the basis, in lieu of specimens, of so many of the 'species' of the early systematists. Their work, done in good faith and with the laudable intent of systematizing the supposed natural history information of that day, proves a most perplexing legacy to modern zoologists, who have the task of separating fiction and error from the truth, and of saving, wherever

possible, by due restriction, the names bestowed by the fathers of zoology upon composite species.

But to return to the case of Catesby's *Putorius americanus striatus*. Mr. Howell says: "The question is simply, could it have been based on anything else [than *Spilogale*]?" This question I have already answered in the negative by saying it "must have been based, to take the most charitable view of the case, on a confused recollection of the little spotted skunk and the common skunk;" or, as Mr. Howell quite as well puts it, on "his recollection of an animal seen afield, perhaps at some distance, and probably in the dusk of twilight." Is this a legitimate basis for the overturning of two properly founded and long-accepted genera, and for the introduction of corresponding changes in the names of some forty to fifty species and subspecies? Really the drawing, taken all in all, quite as well fits the common skunk as the spotted skunk; *five* white stripes, some of them running from the nose to the base of the tail and one of them continued over the basal third of the tail, do not very strongly suggest *four* white stripes limited to the front half of the body, succeeded on the posterior half by a series of interrupted *transverse* white stripes, nor does the very long broad wholly black tail (except for the basal stripe) suggest the long white tail tip of either skunk. But why should we particularize when there is scarcely a color marking on Catesby's animal that is like any marking on any known skunk. Its being a black animal with longitudinal white stripes is all there is about it that suggests any form of skunk. If the ground color had not been described as black, and the figure had been labelled Striped Ground Squirrel, it could quite as well have been accepted as a *Tamias* as a *Spilogale* or a *Mephitis*.

Here is certainly a case for the application of Canon XLIV of the A. O. U. Code of Nomenclature, which reads: "In determining the pertinence of a description or figure on which a genus, species, or subspecies may respectively rest, the consideration of pertinency is to be restricted to the species scientifically known at the time of the publication of the description or figure in question, or to contemporaneous literature." In the present case, of course, the description or name in question is Linnæus's *Viverra putorius*. And at this late day when the

fauna of Catesby's region is well-known, Mr. Howell asks us, What else can Catesby's figure represent if it is not a *Spilogale*?—at the same time admitting that it does not represent any known animal.

It is a pity to waste so much ink and paper over nomenclatural details, but there are a few other points in Mr. Howell's ingenious effort to make black pass for white, and *vice versa*, to which attention should be called. He says, for instance: "The name *Mephitis putorius*, based on Catesby's species, was first used by Dr. Coues, who applied it in a broad sense to all the little spotted skunks of North America. Some years later, the name was definitely fixed by Dr. Merriam to the Florida species. Its use by these two authors would seem to be sufficient to establish the name on a firm basis. The only way in which it can now be overthrown is to show beyond question that it cannot possibly apply to a *Spilogale*, which has not been done." To take up the last point first, if it had not been done before Mr. Howell wrote his last paper on the *Chincha* case, this paper, with his admirable plate of comparative figures, and his own admissions, have most effectually accomplished it.

As Dr. Coues was the first to revive *Viverra putorius* (as he was to revive many other untenable names), how about the action of previous authors, those who, like Dr. Coues, were investigators and not mere compilers, who repudiated the name, as, for example, Gray, Lichtenstein, Wagner, and many others, not to mention those who ignored it as simply uncitable, as Baird, among many others. As early as 1838 Lichtenstein went into the matter at length and rejected the name as unworthy of serious consideration. Even Coues*, in speaking of *Viverra putorius* Linn., says: "Diagnosis agrees sufficiently with *Spilogale*;" but adds, "general bearing rather upon *Mephitis mephitis*." But the context shows that he was referring to Linnæus and not to Catesby, Linnæus's diagnosis being "*V. fusca lineis quatuor albidis dorsalibus parallelis*;" so that, by a slip, or otherwise, Linnæus gave *four* white stripes and not *five*. His diagnosis thus does not agree with Catesby's de-

*Fur-bearing Animals, 1877, in the synonymy at the beginning of page 239.

scription and figure; yet, as Coues says, it was "based primarily upon *Putorius americanus striatus* Catesby." The only other author Linnæus cited under this name in 1758 was Kalm, whose account of the external characters of the Pennsylvania skunk is a paraphrase of Catesby's. This slip of Linnæus's in paraphrasing Catesby would of course greatly help the case for *Spilogale* were it not that there is no other source than Catesby as the basis for his diagnosis. Coues was evidently influenced by this error in accepting *putorius*, as he refers repeatedly in his discussion of the matter to the "four stripes" mentioned by Linnæus, while it is not at all evident that he actually consulted Catesby in this immediate connection.

As said in my former paper, the two Linnæan skunk names, *Viverra memphitis* and *V. putorius*, are both equally uncitable, and, aside from perfunctory compilers, were so treated by all scientific writers prior to Coues's attempted revival of *putorius* in 1875.

Mr. Howell says (p. 6), that the question of the type of *Mephitis* was not affected by the revisions of the genus by Gray (1837) and Lichtenstein (1838), because they simply removed from the group to new genera species which had been placed under *Mephitis* by later authors. Mr. Howell thus fails to grasp the fact that these removals were in effect a restriction of the genus *Mephitis* to its original components, and that therefore Lesson, in 1842, could not substitute a new genus *Chincha* for the old and already repeatedly restricted genus *Mephitis*. Nor does he seem to recognize the impropriety of his attempt to enforce this substitution, and his own transference of *Mephitis* to the *Spilogale* group, on the basis of a nominal species rejected as having no proper foundation by all investigators of the matter down to Coues, who was influenced, as already shown, by Linnæus's evident lapsus in writing *quatuor* where he should have written *quinque*, and not by the real character of Catesby's description and figure on which Linnæus's diagnosis must, in the nature of things, have been based. Catesby says his animal had a median white stripe running from the head to the rump, "with four others, two on each side, running parallel with it." Evidently Linnæus in compiling his diagnosis must have carelessly missed the reference to the median white stripe, or else

wrote *quatuor* in lapsus for *quinque*.* If Coues had taken Catesby's description and figure instead of Linnæus's erroneous and repeatedly corrected diagnosis, it seems very improbable that he would have revived *Viverra putorius* for a species of *Spilogale*.

Again, Mr. Howell says that the reason Cuvier excluded *Viverra zorilla* from his Mouffettes is because Cuvier "considered it to be a weasel from the Cape of Good Hope and not a skunk at all." It is true, as I have before shown, that Cuvier believed that *Viverra zorilla* was a South African animal, but it is also true that he had specimens of it, and probably really excluded it on the same grounds that lead present day naturalists to exclude it from *Mephitis* and assign it to a separate genus *Spilogale*, namely, the character of the skull and teeth.† So, as said in my former paper,† he purposely excluded from his Mouffettes the only then known species of *Spilogale*, thus rendering it impossible to transfer the name *Mephitis* to the *Spilogale* group, as Mr. Howell has attempted to do.

Mr. Howell's contention that Cuvier's *Mustela putida* is based directly on *Viverra putorius* Linn. I am unwilling to concede, but hold that its real basis is the Conepate of Buffon. The two, however, have the same basis, Catesby and Kalm, but the Cone-

*It is important to note in this connection that Schreber, Erxleben, Zimmermann, and Gmelin wrote *quinque* and not *quatuor*, and that Schreber, evidently with Catesby's work before him, corrected Linnæus in quoting his diagnosis, as shown by the following literal transcript from Schreber: "*Viverra putorius*; *Viverra fusca* (vielmehr *nigricans*), lineis *quatuor* (oder eigentlich *quinque*) *dorsalibus parallelis albidis*. LINN. Syst. [ed. 12] p. 64, n. 4."—Schreber, Säuget., III, p. 442.

It may be further noted that Cuvier's diagnosis is evidently from Gmelin and not from Linnæus, for he says: "*Noir, à cinq lignes parallèles, blanches sur le dos*;" and that his "*Viverra putorius* L." should unquestionably stand *Viverra putorius* Gm. It also renders it probable that Cuvier's citation of "*Viverra mephitis* L." under his "*le chinche*" should also read *Viverra mephitis* Gm., as Mr. Howell has already suggested (N. Am. Fauna, No. 20, p. 14).

†"Si.... nous venons à examiner en lui-même l'animal auquel Buffon a appliqué le nom de *zorille*, et qu'il a représenté Hist. Nat. in-4°, tome XIII, pl. 42 [lege xli] nous trouvons qu'il ressemble par les dents, par les ongles et par la forme, comme par la grandeur, à notre *putois d'Europe*."—G. Cuvier, Ann. du Mus. d'Hist. Nat., IX, 1807, p. 445.

†Bull. Am. Mus. Nat. Hist., XIV, 1901, 330.

pate is mainly Kalm while *V. putorius* is mainly Catesby. The Kalm element is therefore the saving feature in each case; but if *putida* from Cuvier cannot be used for the skunk of eastern Pennsylvania and New Jersey, neither can *putida* from Boitard be used for it, on account of the prior use of the name in the same genus (*i. e.*, *Mephitis*) by Cuvier. It may, however, be well to throw out *putida* as untenable, on accounts of its composite, very slight and wholly unsatisfactory basis.

From the foregoing it is evident that I recede in no essential point from any of the positions assumed in my first paper, and that consequently I accept none of Mr. Howell's conclusions as formally stated by him in the summary at the close of his paper. They all depend, as said at the beginning of this article, upon the acceptance of the much discussed Catesby plate as a satisfactorily identifiable figure of the North Carolina *Spilogale*. With Mr. Howell's plate before them, I think few mammalogists will be able to agree with Mr. Howell on this point.

20

*A New Caribou from the Alaska
Peninsula.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XVI, ARTICLE X, pp. 119-127.

New York, March 31, 1902.

LIST OF ANTHROPOLOGICAL PAPERS FROM THE BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

	PRICE
A Table of the Geographical Distribution of American Relics in a Collection exhibited in the American Museum of Natural History, with Explanatory Text, by A. E. Doug- lass (Vol. VIII, 1896). 22 pp.	\$0.75
The Temple of Tepoztlan, Mexico, by M. H. Saville (Vol. VIII, 1896). 6 pp., 5 pl.	.50
A Rock Painting of the Thompson River Indians, British Columbia, by James Teit, edited by Franz Boas (Vol. VIII, 1896). 4 pp.	.30
The Decorative Art of the Indians of the North Pacific Coast, by Franz Boas (Vol. IX, 1897). 54 pp.	.75
An Ancient Figure of Terra Cotta from the Valley of Mexico, by M. H. Saville (Vol. IX, 1897). 4 pp., 2 pl.	.40
The Huichol Indians of Mexico, by Carl Lumholtz (Vol. X, 1898). 14 pp., 2 pl.	.50
Marked Human Bones from a Prehistoric Tarasco Indian Burial-Place in the State of Michoacan, by Carl Lumholtz and Aleš Hrdlička (Vol. X, 1898). 20 pp., 5 pl.	.60
Description of an Ancient Anomalous Skeleton from the Valley of Mexico, with Special Reference to Supernumerary and Bicipital Ribs in Man, by Aleš Hrdlička (Vol. XII, 1899). 28 pp., 5 pl.	.50
The Eskimo of Smith Sound, by A. L. Kroeber (Vol. XII, 1899). 64 pp., 4 pl.	.80
Symbolism of the Arapaho Indians, by Alfred L. Kroeber (Vol. XIII, 1900). 16 pp.	.25
A Shell Gorget from the Huasteca, Mexico, by Marshall H. Saville (Vol. XIII, 1900). 6 pp.	.25
An Onyx Jar from Mexico, in Process of Manufacture, by M. H. Saville (Vol. XIII, 1900). 4 pp., 1 pl.	.30
Cruciform Structures near Mitla, by Marshall H. Saville (Vol. XIII, 1900). 18 pp., 10 pl.	1.00
A Bilateral Division of the Parietal Bone in a Chimpanzee, with a Special Reference to the Oblique Sutures in the Parietal, by Aleš Hrdlička (Vol. XIII, 1900). 16 pp.	.30
A Bronze Figurine from British Columbia, by Franz Boas (Vol. XIV, 1901). 2 pp., 1 pl.	.25
A. J. Stone's Measurements of Natives of the Northwest Terri- tories, by Franz Boas (Vol. XIV, 1901). 16 pp., 5 pl.	.80
The Eskimo of Baffin Land and Hudson Bay, by Franz Boas (Vol. XV, 1901). 370 pp., 4 pl.	3.00
Basketry Designs of the Indians of Northern California, by Roland B. Dixon (Vol. XVII, 1902). 32 pp., 37 pl.	1.50

Article X.—A NEW CARIBOU FROM THE ALASKA PENINSULA.

By J. A. ALLEN.

One of the results of the past season's work of the Andrew J. Stone Expedition is the discovery by Mr. Stone of a new form of Caribou on the Alaska Peninsula. The greater part of the season of 1901 was spent in further exploration of Kenai Peninsula, to complete the work begun there by Mr. Stone during the autumn of 1900, where he obtained a specimen of the new Caribou since described as *Rangifer stonei*.¹

Mr. Stone's familiarity with the large game of the far North had led him to anticipate that the form of Caribou inhabiting the Alaska Peninsula,—the most western portion of the mainland of Alaska, and extending several hundred miles beyond the western limit of tree growth,—would prove of especial interest, and at the close of the season of 1901 he left Homer, on Kenai Peninsula, for the express purpose of securing a good series of specimens of this animal. The journey of nearly 1000 miles was made during the latter part of October, when the season was far advanced and navigation dangerous, but the opportunity seemed too favorable, on account of his comparative nearness to the locality, to forego the chances of the trip. The departure from Homer was made on the 15th of October, and Sand Point, Popoff Island, was reached by steamer four days later, but owing to continuous storms it was impossible to cross to the mainland, only twelve miles distant, till October 26, and it still required two days more to reach the point on the coast, some twenty miles distant, which had been selected as the field of operations. The first day's hunt, on October 29, was rewarded by the capture of nine head of Caribou, and others were taken later, until fifteen fine specimens had been secured.

These specimens, taken October 30 to November 9, are very uniform in their general characters, and differ from the

¹ This Bulletin, Vol. XIV, 1901, pp. 143-148.



Fig. 1. *Rangifer granti*. No. 17601, ♂ ad., Alaska Peninsula. Andrew J. Stone Expedition. $\frac{1}{2}$ nat. size.

other forms of Caribou known from North America in various external features and in many cranial peculiarities.

In view of the important services rendered by Mr. Madison Grant, Secretary of the New York Zoölogical Society, in securing funds for the organization and maintenance of the



Fig. 2. *Rangifer granti*. Same specimen as Fig. 1. About $\frac{1}{10}$ nat. size.

Andrew J. Stone Expedition, and in recognition of his well-known interest in securing specimens of the game animals of North America for exhibition and for scientific research, this new and very interesting type of Caribou may be fittingly named

***Rangifer granti*, sp. nov.**

Type, No. 17593, ♂ ad., western end of Alaska Peninsula, opposite Popoff Island, Oct. 29, 1901; Andrew J. Stone Expedition.

Adult male, end of October. — General color above dark brown; rump patch white; on lower parts of flanks a broad whitish band



Fig. 3. *Rangifer granti*. ♂ ad. Same specimen as Fig. 1.
About $\frac{1}{2}$ nat. size.

behind the shoulder, rapidly narrowing posteriorly and becoming lost in the general coloration; below this a dark lateral band, separating the dark color of the sides from the white ventral surface; top of shoulders and sides of neck light gray, strongly tinged with cream-white, the tips of the hairs yellowish gray, the basal two-thirds dark gray; long hair on median ventral line of neck yellowish white, not greatly lengthened as in *R. stonei*; muzzle, chin and edges of lips silvery grayish white; whole top of nose very dark brown or blackish brown, becoming lighter posteriorly; sides of head lighter brown, passing into paler yellowish brown on sides of throat, and into yellowish white on the median line; fore neck (except median line) yellowish, the tips of the hairs darker, yellowish gray-brown; pectoral area very dark brown, nearly as dark as the top

of the nose; whole ventral surface yellowish white, becoming nearly pure white posteriorly and on the inside of the thighs; front of fore

limbs dark brown, sides lighter, posterior surface nearly white, forming a narrow longitudinal stripe; hind legs similarly marked but less dark on the outer surface; a narrow line of yellowish white borders the hoofs of both fore and hind feet; tail white, with a dark band continued from the back through the white rump patch onto its upper surface.

Adult Female, end of October. — Considerably lighter throughout than the male, the back and sides brocoli brown, and the dark parts of the face and the pectoral area lighter than in the male.

Young. — A six-months old calf (female) has the general coloration creamy white, clearer white on the ventral surface. The dark areas seen in adults are veiled by the long yellowish white tips of the hairs, being barely indicated as a darker shade showing through the surface on the legs, front of the head and over the middle portion of the back. In general color effect this specimen closely resembles the summer coat of the White Sheep (*Ovis dalli*). It retains its spike antlers, which are still in the velvet, and are black instead of grayish brown, as are those of *R. caribou* and *R. terranova* at a corresponding stage.

A young male of the same age resembles the young female except in being somewhat darker, with the incipient dark areas more strongly outlined. These two young specimens were with their mothers when killed and evidently were not yet weaned, the udders of the old females being full of milk.

The adult male above described as the type is the darkest of the



Fig. 4. *Rangifer granti*. No. 17595, 2 ad., Alaska Peninsula. Andrew J. Stone Expedition. $\frac{1}{3}$ nat. size.

whole series, other males of corresponding age having the dark parts of the body, limbs and head much paler, nearly as in the above described female. The series of four adult males ranges in the color of the dark parts from clove brown to broccoli brown, the variation in color being doubtless due to the seasonal condition of the pelage, the lighter coat being probably a more advanced stage toward the full winter coat.

Measurements.—The collector's measurements given below, taken from the freshly killed specimens before skinning, indicate the very small size of this animal as compared with any of the woodland



Fig. 5. *Rangifer granti*, ♀ ad. Same specimen as Fig. 4.
 $\frac{1}{2}$ nat. size.

species, and the great length of the tail vertebrae, which averages 192 mm. in the five males as against 152 in a corresponding series of males of *R. montanus*, notwithstanding the fact that the latter is a very much larger animal. The height of the males at the shoulders is also some 200 mm. less in *R. granti* than in *R. montanus*.

Skull.—In size the skull most resembles that of *R. grænlandicus* (*R. arcticus* is not available for comparison), but the antlers, while light and slender, are about one third shorter in the length of the main beam, and the brow antlers and principal branches are proportionately reduced. The skull is rather smaller than in *R. grænlandicus*, with relatively much longer nasals, which average 122 mm. in a series of four males as against 112

mm. in two males of *R. grænlandicus*, the basal length of the skull averaging the same in both species. The skull differs from

that of *R. stonei*, geographically its nearest neighbor, in its strikingly small size, the mastoid breadth being 128 mm. in the former and 158 mm. in the latter, with all that this implies in respect to the general size. Notwithstanding this, the nasal bones are as long in *R. granti* as in *R. stonei*, while the relative length of the intermaxillaries is greatly reduced in *R. granti*, giving very different proportions to the parts that enter into the rostral portion of the skull. The antlers in the two forms are also strikingly different, as regards size and weight, and especially in the form of the brow antlers. As regards cranial characters no comparison is necessary with *R. montanus* or with any of the woodland forms.

EXTERNAL MEASUREMENTS.

	17580 ♂ ad.	17590 ♂ ad.	17591 ♂ ad.	17593 ♂ ad.	17600 ♂ ad.	17594 ♀ ad.	17595 ♀ ad.	17599 ♂ juv.	17596 ♀ juv.
Total length.....	1880	1778	1727	1880	1905	1664	1651	1397	1574
Tail vertebrae.....	190	190	190	203	191	165	165	140	152
Length of hind foot (tarsus and foot),...	559	569	546	572	584	533	521	470	495
Length of fore foot (carpus and foot),...	686	686	724	724	724	635	635	572	597
Height at shoulder,...	1118	1118	992	1095	1245	929	903	953	992
Head of humerus to head of femur.....	916	864	864	941	916	483	864	762	813
Width of chest,.....	267	254	241	279	305	229	241	203	229

MEASUREMENTS OF SKULLS.

	17601 ♂ ad	17593 ♂ ad	17598 ♂ ad	17600 ♂ ad	17589 ♂ ad	17595 ♀ ad
Basal length.....	375	364	370	370	350	310
Tip of premaxilla to tip of nasal.....	100	107	99	93	89	75
Tip of premaxilla to alveolus of p ¹	120	117	124	116	109	102
Length of nasals.....	119	123	126	118	124	109
Breadth above m ²	117	107	113	109	109	98
Zygomatic breadth.....	138	141	141	134	133	122
Greatest breadth at orbits.....	167	169	166	154	161	149
Mastoid breadth.....	128	135	131	111	117	95
Palatal breadth at m ¹	63	61	64	61	62	56
Upper toothrow, crown surface.....	103	102	96	104	101	92
Distance between antlers below the burr..	64	56	60	61	48	56
Length of mandible, incisive border to angle.....	294	300	292	290	266	247
Angle to tip of coronoid.....	130	130	135	130	130	115
Depth at m ²	38	33	33	35	37	35
Length of lower toothrow.....	108	102	100	103	108	96
Diastema.....	106	102	106	108	108	98
Antlers, main beam to tip, along curvature	860	850	1010	780	820	364
greatest spread at point of pal-						
matation.....	890	775	815	685	640	275
distance between tips of longest						
tines.....	810	683	...	685	545	...
" " " points at tip of						
main beam..	810	685	720	600	450	210

Rangifer granti is a representative of the Barren Ground group of Caribou, which includes *R. arcticus* of the Arctic



Fig. 6. *Rangifer granti*, ♀ ad. Same specimen as Fig. 4. About $\frac{1}{3}$ nat. size.

Coast and *R. grælandicus* of Greenland. It is not closely related to *R. stonei* of the Kenai Peninsula, from which it differs not only in its very much smaller size, but in important cranial characters and in coloration. *R. stonei* was described¹ from a single fine head (including both skin and skull), collected by Mr. Stone on the Kenai Peninsula in 1900. This single incomplete specimen was insufficient to show the very strong differences that obtain between *R. stonei* and *R. montanus*. Mr. D. G. Elliot has since given a full description of the same species² from a mounted specimen collected by Mr. H. E. Lee, on Kenai Peninsula September 5, 1898. Mr. Lee's specimen shows the same type of antlers, with the brow antlers very heavily developed, and dis-

tinctive features of coloration, including the absence of a caudal patch, so strongly and uniformly developed in *R.*

¹ This Bulletin, Vol. XIV, 1901, pp. 143-148, fig. 1-4.

² Publications Field Columbian Museum, Zool. Ser., III, No. 5, pp. 59-62, pl. xi-xiii.

granti. The external and cranial differences between *R. granti* and the various forms of the Woodland Caribou are so great in almost every respect that no detailed comparison is necessary.

According to Mr. Stone, *Rangifer granti* inhabits the "barren land of Alaska Peninsula, ranging well up into the mountains in summer, but descending to the lower levels in winter, generally feeding on the low flat lands near the coast and in the foothills. They formerly lived in considerable numbers on Unga Island, where they are now practically extinct. The only other island inhabited by them is Unimak Island, at the western end of the Alaska Peninsula. They were formerly exceedingly abundant, but they have been of late greatly reduced in numbers through the agency of market hunters."

The habitat of *R. granti* is thus an isolated area occupying the treeless portion of the Alaska Peninsula and (formerly at least) some of the immediately adjoining islands at the extreme western end of the peninsula.

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	" 4.75	" " " II, 1899 " "	2.00
" III, 1890-91.....	" 4.00	" " " III, 1900 " "	2.00
" IV, 1892.....	" 4.00	" " " IV, 1901 " "	1.75
" V, 1893.....	" 4.00	" " " (Complete). " "	5.00
" VI, 1894.....	" 4.00	" XII, 1899.....	4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " "	3.00
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.**—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.**—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.**—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.**—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.**—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.**—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.**—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.**—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.**—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.**—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.**—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.**—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.**—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

21

A New Bear from the Alaska Peninsula.

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XVI, ARTICLE XIII, pp. 141-143.

New York, April 12, 1902.

The Knickerbocker Press, New York

Article XIII.—A NEW BEAR FROM THE ALASKA PENINSULA.

By J. A. ALLEN.

PLATES XXX AND XXXI.

Another¹ interesting and unexpected addition to the mammalian fauna of the Alaska Peninsula, obtained by the Andrew J. Stone Expedition, is a new species of large bear, represented by a skin and skull obtained by Mr. Stone at Portage Bay, opposite Port Müller, Alaska Peninsula.

This bear is of special interest not only on account of its large size, but also on account of the cranial differences it presents in comparison with the bears of the Kenai Peninsula and Kadiak Island. The skull and skin belong to different individuals, the skin being that of (probably) a very old male, and the skull that of a full-grown but not aged adult. In recognition of Dr. C. Hart Merriam's excellent revision of the North American Bears² this species may appropriately bear the name

Ursus merriami, sp. nov.

Type.—No. 17622, skull ♂ ? adult, but not old, Portage Bay, opposite Port Müller, Alaska Peninsula, 1901; Andrew J. Stone Expedition.

Topotype.—No. 17621, skin, ♂ ? adult, Portage Bay, Alaska, May, 1901; Andrew J. Stone Expedition.

Head yellowish brown, with a broad dark brown median band running forward from the nape as far as the eyes; cheeks and throat dull dark brown with a cast of reddish; whole dorsal region dark brown with the tips of the hairs light, resulting in a yellowish gray surface tint, which is lightest over the shoulders and darker posteriorly and on the sides; lower part of flanks, whole ventral surface, and the limbs dark ruddy brown, much darker than the upper surface of the body.

Measurements.—The external measurements available are only such as can be obtained from the flat skin, as follows: length from nose to tail, 3050 mm.; from tip to tip of outstretched fore limbs, 3230; from

¹ See this Bulletin, Vol. XVI, Art. X, pp. 119-127, March, 1902.

² 'Preliminary Synopsis of the American Bears.' Proc. Biol. Soc. Washington, Vol. X, pp. 65-83, pll. iv-vi, April 13, 1896.

tip to tip of outstretched hind limbs, 2645. Longest fore claw, from base to tip in a straight line, 70; chord of arc, lower surface of claw, 57; transverse diameter at base, 14; antero-posterior diameter at base, 27. Longest hind claw, 33; transverse diameter at base, 10; antero-posterior diameter at base, 21. The claws are much longer, less curved, and much stouter than in the Alaskan Grizzly.

Skull.—Long and narrow, with moderately expanded zygomatic arches, and comparatively low and not greatly expanded forehead. In fact, the skull, seen only from above, might almost be referred to the Polar Bear group. It consequently follows that it is in strong contrast as regards its general contour with the broad, relatively short, high skull of *Ursus middendorffi* and allied forms.

Greatest length (front of premaxillary to end of occipital crest), 395 mm.; basal length (inner base of incisors to posterior border of condyles), 380; occipito-sphenoid length, 100; postpalatal length, 150; zygomatic breadth, 209; interorbital breadth, 81; breadth at post-orbital processes, 110; length of nasals, 108; palatal length, 186; palatal breadth, 51; occipito-nasal length, 330; length of upper molar-premolar series, 114; length of lower jaw, 260; height of coronoid, 114; length of lower molar-premolar series, 132.

Ursus merriami seems most nearly allied to *U. dalli* Merriam, from Yakutat Bay, the skull being long and narrow with the interorbital region only slightly elevated and not greatly expanded, in this respect differing greatly from *U. middendorffi* of Kadiak Island and the eastern portion of the Alaska Peninsula. The palatal region, however, is longer and one fifth narrower than in *U. dalli*,¹ from which it differs so much, and in so many important details that further comparison of the two forms is necessary.

Since preparing the foregoing paper and the illustrations accompanying it, I have received a paper from Dr. Merriam entitled 'Two New Bears from the Alaska Peninsula,'² in which he describes a bear from Pavlof Bay under the name *Ursus dalli gyas*. This is probably the nearest ally of *Ursus merriami* yet described, but the description of the skull is brief and incomplete, and does not, in several important points,

¹ For comparison in the present connection Dr. Merriam has kindly loaned me a skull of *Ursus dalli* (No. 75047, from "near Mt. St. Elias"), figured in pl. vi, fig. 5, of his paper already cited—a very old specimen with much worn teeth.

² Proc. Biol. Soc. Washington, Vol. XV, pp. 77-79, March 22, 1902.

agree well with the skull of *U. merriami*. It seems to indicate a wholly different type of animal, especially in having the skull "much larger, heavier and more massive" than in *U. dalli*, with the cranium higher and more vaulted, features just the opposite of those presented by *U. merriami*. Neither does the brief description of the teeth accord well with the dentition of *U. merriami*. (See Plates xxx and xxxi.)

The locality of Mr. Stone's specimens is Portage Bay, on the Alaska Peninsula, opposite the Shumagin Islands, some 600 to 700 miles west of the type locality of *Ursus dalli gyas*, and in a very different faunal area.

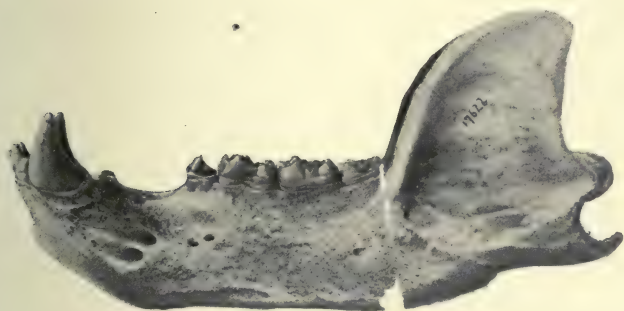
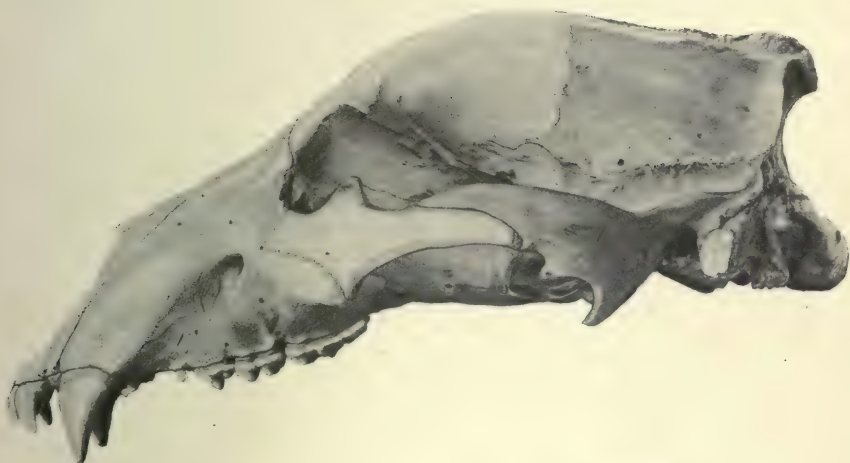
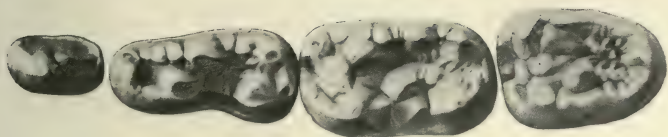




URSUS MERRIAMI, SP. NOV.

$\frac{1}{3}$ nat. size.





URSUS MERRIAMI, SP. NOV.

Skull and lower jaw $\frac{1}{2}$ nat. size; teeth (lower molar series) slightly less than nat. size.



(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	" 4.75	" " " II, 1899 " 2.00	
" III, 1890-91.....	" 4.00	" " " III, 1900 " 2.00	
" IV, 1892.....	" 4.00	" " " IV, 1901 " 1.75	
" V, 1893.....	" 4.00	" " (Complete). " 5.00	
" VI, 1894.....	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	" 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	" 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " 3.00	
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiiq-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

52

Description of a New Caribou from Northern British Columbia, and Remarks on Rangifer montanus.

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XVI, ARTICLE XV, pp. 149-158.

New York, April 16, 1902.

The Knickerbocker Press, New York

**Article XV.—DESCRIPTION OF A NEW CARIBOU FROM
NORTHERN BRITISH COLUMBIA, AND RE-
MARKS ON *RANGIFER MONTANUS*.**

By J. A. ALLEN.

A series of Caribou collected by Mr. Andrew J. Stone for the American Museum in the Cassiar Mountains, northern British Columbia, September 15–26, 1897, were provisionally referred by me to *Rangifer montanus*,¹ described in August, 1899, by Mr. Ernest Seton-Thompson² from a mounted specimen in the Museum of the Canadian Geological Survey, "taken in the Illecillewaet watershed, near Revelstoke, Selkirk Range, B. C., in 1889." A series of four specimens, two fine adult males and two fine adult females, taken September 26, 1901, have just been received by the Museum, collected in the Gold Range Mountains, twenty-five miles southeast of Sicamous, and are thus practically topotypes of *Rangifer montanus*. These specimens show that the Caribou from the Cassiar Mountains is very different from *Rangifer montanus* of the Selkirks. The specimens of the two series having both been taken during the last half of September, they are strictly comparable as regards season.

***Rangifer osborni*, sp. nov.**

Rangifer montanus ALLEN, Bull. Am. Mus. Nat. Hist., XIII, 1900, Art. I., pp. 1–18, figs. 2–6, 11, 15, and 16. Not *Rangifer montanus* Seton-Thompson.

Type, No. 15714, ♂ ad., Cassiar Mountains, British Columbia, Sept., 1897; Andrew J. Stone (James M. Constable Expedition).

The largest of all known Caribou, with very long and very heavy antlers, which have a low and very long backward sweep.

Adult Male, in September.³—General color above clove-brown, darkest on the head, back, thighs, and lower edge of the sides of the chest, and still darker, blackish brown, on the breast and limbs; muzzle, including the whole end of the nose and front border of the lower lip,

¹ This Bulletin, Vol. XIII, 1900, pp. 1–18, April 3, 1900.

² 'Preliminary Description of a New Caribou,' The Ottawa Naturalist, XIII, August, 1899, pp. 129, 130.

³ The following description and measurements are from my former paper (*l. c.*, pp. 5 and 6).

silvery grayish white, succeeded by a broad band of blackish brown, which fades posteriorly on the sides of the head and below into the general color, but extends broadly over the front part of the head to



Fig. 1. *Rangifer osborni*, ♂ ad., No. 15714, Cassiar Mts., B. C.; A. J. Stone. $\frac{1}{2}$ nat. size.

the eyes; neck all round brownish gray, lighter on the sides than above, becoming nearly white in front; the gray color of the sides of the neck extends posteriorly over the anterior part of the shoulders, and is continued as an ill-defined broad band on the sides of the chest; ventral surface, from the chest posteriorly, grayish white, passing into pure white posteriorly and on the inside of the thighs; rump patch white, large and sharply defined; tail above centrally dark brown like the back, broadly edged and tipped with white; a narrow band of pure white borders the hoofs; ears externally dark brown, mixed with gray and edged with blackish; internally much lighter, becoming light gray at the inner base. In one specimen there is a broad band of whitish



Fig. 2. *Rangifer osborni*, ♂ ad., Cassiar Mts., B. C.; Coll. A. J. Stone. $\frac{1}{3}$ nat. size.

gray above and below the eye, forming an imperfect eyering; but this seems exceptional, and is probably a remnant of the summer coat, the majority of the specimens having the eye region dark like the adjoining parts of the face.

Female and Young-of-the-year.—The female does not appear to differ materially from the male. The young-of-the-year, however, is much lighter than the adult, having the whole ventral area white, and the whole neck and the sides much lighter; the dark color of the upper parts is lighter and restricted in area to the middle of the back from the shoulders posteriorly; the tail is all white except at the base above.

Measurements.—The following are the collector's measurements taken from the freshly killed specimens before skinning:

EXTERNAL MEASUREMENTS.

	No. 4 ¹ ♂ ad.	No. 5 ♂ ad.	No. 6 ♂ ad.	No. 7 ♂ ad.	No. 8. ♀ ad.	No. 9 ♀ juv.
Total length.....	2083	2057	2210	2172	1930	1499
Tail.....	152.4	152.4	152.4	152.4	177.8	114.3
Height at shoulder.....	1321	1270	1346	1397	1245	991
Hind limb to hip.....	1295	1334	1245	1359	1145	965
Length of hind foot.....	610	635	635	597	597	522
Fore leg to elbow.....	597	584	610	646	521	432
Width of chest.....	326	326	368	368	305	229
Depth of chest.....	775	787	787	749	711	610
Ear ² from crown.....			140	140		
" " notch.....			115	120		

Skull.—In addition to its large size, the skull of *R. montanus* is peculiar in the unusual elongation of its facial portion. The antlers are similar in length and proportions to those of the Barren Ground Caribou, but more massive, with the palmated portions much broader and heavier. (For measurements see p. 153.)

Of the six specimens collected by Mr. Stone in the Cassiar Mountains, four are adult males, one is an adult female, and the other a young-of-the-year female. The female and three of the males agree very closely in coloration; the other male, apparently the oldest of the series, is much paler-colored throughout.

¹ Collector's numbers. No. 6 = Mus. No. 15714; No. 8 = Mus. No. 15715; No. 9 = Mus. No. 15716. The original measurements, given in inches, are here reduced to millimetres.

² Measurements from dry skins, exclusive of hair.

COMPARATIVE MEASUREMENTS OF SKULLS OF *Rangifer osborni* AND *R. montanus*.

	<i>R. osborni.</i>		<i>R. montanus.</i>			
	15714 ♂ ad.	15715 ♀ ad.	17971 ♂ ad.	17972 ♂ ad.	17974 ♀ ad.	17973 ♀ ad.
Basal length.....	420	360	430	420	360	355
Tip of premaxilla to tip of nasals.....	125	100	121	120	97	101
Tip of premaxilla to al- veolus of first premolar.	148	126	142	137	115	115
Length of nasals.....	123	122	142	122	120	107
Greatest orbital breadth..	182	156	180	172	160	155
Breadth (above m ²).....	127	113	122	120	102	108
Zygomatic breadth.....	148	136	148	157	134	131
Mastoid breadth.....	149	116	146	147	120	113
Palatal breadth at m ...	73	62	72	61	60	55
Depth of skull between antlers.....	112	86	101	94	88	81
Length of upper tooth- row (crown surface)...	99	97	100	101	96	93
Diastema (canine to pm ¹)	72	59	72	71	65	62
Distance between antlers just below burr.....	78	53	64	75	68	75
Distance between outer edge of antlers just be- low burr.....	135	95	139	137	116	102
Length of mandible, inci- sive border to angle....	330	280	310	310	270	275
Angle to condyle.....	109	102	115	105	95	87
“ “ tip of coronoid..	148	137	155	144	127	127
Depth of mandible at m ₂ ..	38	31	40	39	34	31
Length of lower toothrow.	103	103	105	110	99	101
Diastema.....	130	108	121	115	99	101
Antlers, length of main beam.....	1235	405	810	745	370	290
“ distance apart at point of palma- tion.....	875	146	470	320	190	150
“ distance between tips.....	790	—	393	450	—	—
“ distance between points at tip of main beam....	415	100	360	270	235	300

This form of Caribou differs markedly in color from the Woodland Caribou in being very much darker throughout, in

its larger size, longer and heavier antlers, and in the large size of the white rump patch. This patch, measured across the base of the tail, has a breadth of 250 mm., but is divided through the middle by the dark band, 50 mm. wide, that



Fig. 3. *Rangifer montanus*, ♂ ad., No. 17971, Gold Range Mountains, B. C. $\frac{1}{2}$ nat. size.

passes down the tail, the white patch being thus separated into two areas, each with a transverse width of 100 mm.

The relationship of *R. osborni* to *R. montanus* is considered below.

In this connection it is due Mr. Madison Grant to state that

about a year ago he expressed his conviction to me that the Caribou from the Cassiar Mountains, referred provisionally



Fig. 4. *Rangifer montanus*. Same specimen as Fig. 3. $\frac{1}{2}$ nat. size.

to *R. montanus*, would prove to be different from true *R. montanus* of the Selkirk Range, and it is through his instigation and valued assistance that the four Selkirk specimens

described below have been obtained for the Museum. They were procured through Mr. T. E. Wilson of Banff Hot Springs, Alberta.

The Cassiar form is named for my colleague, Prof. Henry F. Osborn, Curator of the Department of Vertebrate Palæontology, in recognition of his cordial assistance in obtaining funds to equip and maintain the Andrew J. Stone Expeditions.

***Rangifer montanus* Seton-Thompson.**

Rangifer montanus SETON-THOMPSON, Ottawa Naturalist, XIII, No. 5, Aug., 1899, 129. Type locality, Selkirk Range, near Revelstoke, B. C. Type, mounted specimen, Museum Canadian Geological Survey, Ottawa, Canada.

Mr. Seton described the type of *Rangifer montanus* as follows:

"The general colour is a deep umber brown, very glossy, and darkening nearly to black on the lower parts of the legs. The neck is dull greyish white, also the underside, the buttocks, lips and belly. Along the ribs on each side is a greyish patch a little lighter than the surrounding brown. The white fringe above each hoof is shining white and *very narrow*."



Fig. 5. *Rangifer montanus*, ♀ ad., No. 17973, Gold Range Mountains, B. C. About $\frac{1}{2}$ nat. size.

The date of capture is given as 1889, the month or season not being stated. The specimens now described were killed the last week in September, and are apparently very much

darker in color than Mr. Seton's description would imply. They may be described as follows:

Whole body and legs blackish brown, varying (in different specimens) to glossy black over the middle of the dorsal area from shoulders to rump; lighter, more brownish black, on the flanks and ventral sur-



Fig. 6. *Rangifer montanus*, ♀ ad. Same specimen as Fig. 5. About $\frac{1}{4}$ nat. size.

face; inguinal region, sides and under surface of tail, a narrow band bordering the hoofs, and ventral median line of neck, grayish white; nose and edge of lips grayish white; sides of neck grayish brown; top of neck and shoulders darker grayish brown varied with blackish and, in the males, tinged more or less with rusty. The females are much

darker than the males, especially on the neck and shoulders, but have the grayish white areas of the males replaced by nearly pure white.

Rangifer montanus, in late September pelage, may be described in general terms as a *black* Caribou, with the neck and shoulders, especially in the males, much lighter than the body and limbs; while *R. osborni*, in corresponding pelage, is a *brown* Caribou, with much more white on the rump and posterior ventral surface, and the whole neck and shoulders, as well as the back and limbs, much lighter than in *R. montanus*.

The specimens of *R. montanus* are without measurements, but the species is apparently about the same size as *R. osborni*, as shown by the measurements of the skull given above.

In addition to the marked contrast in color, there are striking differences in the size and form of the antlers in the two forms, the antlers of *R. montanus* being of the typical Woodland Caribou type, and in their relative shortness and much branched character recall strongly the antlers of *R. terrænovæ*, but they are much lighter and more slender than in that species. They have the same abrupt upward curvature of the main beam, in contrast with the much longer and heavier and more depressed backward-sweeping main beam seen in *R. osborni*.

The nearest known relative of *R. osborni* is *R. stonei* from the Kenai Peninsula, which, however, is a differently colored animal, with the rostral portion of the skull much shorter and broader, and other important cranial differences. The antlers also differ greatly in the two species, the antlers of *R. stonei* more resembling those of the Barren Ground and Greenland species.

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Paleontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Paleontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25
" II, 1887-90.....	" 4.75	" " " II, 1899 " 2.00
" III, 1890-91.....	" 4.00	" " " III, 1900 " 2.00
" IV, 1892.....	" 4.00	" " " IV, 1901 " 1.75
" V, 1893.....	" 4.00	" " (Complete). " 5.00
" VI, 1894.....	" 4.00	" XII, 1899..... " 4.00
" VII, 1895.....	" 4.00	" XIII, 1900..... " 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900..... " 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " 3.00
" X, 1898.....	" 4.75	

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

*A New Sheep from the Kenai
Peninsula.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XVI, ARTICLE XIV, pp. 145-148.

New York, April 23, 1902.

The Knickerbocker Press, New York

Article XIV.—A NEW SHEEP FROM THE KENAI PENINSULA.

By J. A. ALLEN.

Through the various expeditions of Mr. Andrew J. Stone the Museum is in possession of fine series of the forms of *Ovis* found in northern North America, including the dark form known as *Ovis stonei* and the light form or White Sheep known as *Ovis dalli*.

In 1897 Mr. Stone collected a large series of the latter from the main Rocky Mountains in latitude $66^{\circ} 30'$, which, while not topotypes, doubtless very nearly represent the typical phase of *O. dalli*. During the season of 1901 he also obtained a large series of White Sheep from the Kenai Peninsula. As both series are in summer coat, they are strictly comparable. *Ovis dalli* in summer coat is yellowish white, with the extreme tips of the hairs cinnamon brown, which impart a decided yellowish brown shade to the greater part of the dorsal surface of the animal. In the series from the Kenai Peninsula the general tone of the color throughout is dingy grayish white instead of yellowish white, with the tips of the hair grayish instead of cinnamon. These color differences are probably adventitious, due to earth stains, and therefore not diagnostic. The skull, however, varies in the two forms, so that the Kenai animal is clearly entitled to subspecific separation, and may be called

Ovis dalli kenaiensis, subsp. nov.

Type, No. 17609, ♂ adult, head of Sheep Creek, Kenai Peninsula, July 10, 1901; Andrew J. Stone Expedition.

Similar in coloration (except from adventitious staining from the soil) and external measurements to true *Ovis dalli* (specimens from Nahanna Mountains and main Rocky Mountains, lat. 66°), but presenting important cranial differences. Adult male skulls of the two forms have practically the same dimensions and the same proportions, except that the posterior nares in *O. dalli kenaiensis* are uniformly shorter than in *O. dalli*, the length in four old males in the former being 59 mm. (58–60), and in three old males of the latter 67 mm. (65–68), showing a marked shortening of the post-palatal region in *O. d. kenaiensis*. This is further indicated by the distance between the base of the paroc-

cipital process and m^3 , which in *kenaiensis* is 84 mm. and in *dalli* 94 mm., while the basal length of the skull is the same in both forms. Correlated with this is a marked difference in the angle made by the basioccipital axis with the palatal axis. These differences are strongly pronounced, as shown in the accompanying illustrations (Figs. 1 and 2). The teeth are also broader and heavier in the Kenai form, the tooth-row is more convex outwardly, and the palate is broader.



Fig. 1.—*Ovis dalli kenaiensis*, ♂ ad., No. 17609, Kenai Peninsula. $\frac{2}{3}$ nat. size.

Considering the great distance separating these two forms of the White Sheep, it is perhaps surprising that the external differences are not more marked. The fact that they are

normally snow white at all seasons, aside from accidental staining, leaves, however, little opportunity for very marked differences in external features. While examples from widely distant localities, taken in summer pelage, may on compari-



Fig. 2.—*Ovis dalli*, ♂ ad., No. 16223, Rocky Mts., Lat. 66° 30'. $\frac{2}{3}$ nat. size.

son present marked differences in coloration, Mr. William T. Hornaday has very conclusively shown¹ that such differences

¹ Fifth Annual Report of the New York Zoölogical Society, June, 1901, pp. 81-91.

are deceptive, on casual examination, and not real. He says :

"A very convincing explanation of the condition of some skins of White Mountain Sheep, which might be described as 'dirty white,' is found in the following interesting statement furnished me on this point by Professor Lewis Lindsay Dyche, of the University of Kansas, based on extensive personal observations in the Alaskan Mountains :

"The White Mountain Sheep are a "dingy or dirty-white" during the summer season only. This is particularly true during the months of July and August. By the first of July the animals have shed their long, thick coats of winter hair. At this time they are almost naked, so to speak, the hair being not more than from $\frac{1}{4}$ to $\frac{1}{2}$ inch in length. The animals frequent the sunny sides of the mountain ranges, and make their beds in masses of shale rock, or on slopes where there is more or less dirt. They frequently paw the rocks and earth away so as to make a form large enough to sleep in. These places become more or less covered with droppings. Light snows and rains come, the earth is damp, and the animals get their hair stained until they become a "dingy or dirty-white." By the first of September the snows are falling, and the animals have a fair coat of hair. They make their beds in the snow, and gradually become white. I saw skins that were white. The ones I got early in September were nearly white, but not beautiful and snow-white like those taken late in the fall and early winter. Pure white skins in the hands of the Indians soon become soiled, and dingy with smoke."

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.	" 4.75	" " " II, 1899 " 2.00	
" III, 1890-91.	" 4.00	" " " III, 1900 " 2.00	
" IV, 1892.	" 4.00	" " " IV, 1901 " 1.75	
" V, 1893.	" 4.00	" " " (Complete). " 5.00	
" VI, 1894.	" 4.00	" XII, 1899.	" 4.00
" VII, 1895.	" 4.00	" XIII, 1900.	" 4.00
" VIII, 1896.	" 4.00	" XIV, 1900.	" 4.00
" IX, 1897.	" 4.75	" XV, Part I, 1901 " 3.00	
" X, 1898.	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xii^a-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

*Nomenclatorial Notes on American
Mammals.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,
VOL. XVI, ARTICLE XVI, pp. 159-168.

New York, July 1, 1902.

The Knickerbocker Press, New York

Article XVI.—NOMENCLATORIAL NOTES ON AMERICAN MAMMALS.

By J. A. ALLEN.

I.—THE GENERIC NAMES *Alce* AND *Alces*.

Alce and *Alces* are variants of the same word, as used by various authors, for the group of Deer of which *Cervus alces* Linn. is the type, and also in a specific sense for Linnæus's *Cervus alces*. Both forms of the word have been used indifferently, or according to preference,—in some cases both forms by the same author,—for the same animal, from Pliny down to the systematists of the seventeenth and eighteenth centuries.

The form *Alce* was first introduced into technical nomenclature in a generic sense by Blumenbach in 1803 (*Manuel d'Histoire Naturelle*, II, p. 407) for the extinct Irish Elk, which he named *Alce gigantea*, this being its first technical name. *Alce* thus antedates *Megaceros* Owen (1844).

In 1827 Hamilton Smith (*Griffith's An. King.*, V, p. 303) used the same form of the word in a subgeneric sense for the *Cervus alces* group; and *Alce* has since been used in the same way by various later writers, as Wagner, 1844, 1855, Baird, 1857, Allen, 1869, Gilpin, 1871, Merriam, 1884, Miller, 1897, etc.

The form *Alces* appears to have been first used for the same group by Jardine in 1835 (*Nat. Libr.*, Mamm., III, 1835, p. 125) and again by Ogilby in 1836 (*P. Z. S.*, 1836, p. 135), and by numerous subsequent writers. It has, however, been often incorrectly attributed to Hamilton Smith (1827) instead of to Jardine (1835) (*cf.* Blasius, *Saug. Deutschl.*, 1857, p. 434; Trouessart, *Cat. Mamm.*, 1897, p. 886; Elliot, *Synop. N. Am. Mamm.*, 1901, p. 37). The two forms having been treated as the same word, *Alces* has been given preference apparently on the supposed ground of correctness, since it was the form used by Linnæus for the species.

In short, from time immemorial, as well as in modern

nomenclature, *Alce* and *Alces* have been treated as the same word, referring (except in the case of Blumenbach) always to the same thing. Mr. Lydekker, in view of these facts, has taken *Cervalces* Scott (1885) as the first available name for the Alcine group of deer. It is clear, however, as shown by Scott (Proc. Acad. Nat. Sci. Phila., 1885, pp. 181-202, figs. 1-7 and pl. ii), that *Cervalces* is generically distinct from *Alces*, and there being no other name available, I propose **Paralces** for the latter group, with *Cervus alces* Linn. as the type. The present known forms are:

1. *Paralces alces* (Linn.).
2. *Paralces americanus* (Clinton).¹
3. *Paralces gigas* (Miller).

This case has an interesting bearing upon the question as to whether or not words etymologically the same but differing by a single letter are both available in nomenclature. As the affirmative side of this question is supported, with or without some reservation, by a number of prominent zoölogists, it is interesting to see how the principle would work in a case like *Alce* and *Alces*. There are four well defined groups of deer characterized by having palmated antlers, but which differ so much in other structural features as to fairly entitle them to generic (certainly to subgeneric) rank. Two of these — *Alce* Blumenbach and *Cervalces* Scott — are extinct; the other two — *Alces* Ham. Smith and *Dama* Ham. Smith — relate respectively to the so-called Moose and Fallow Deer groups. All are closely related types of a single subfamily. As *Alce* and *Alces* have been used interchangeably by the majority of writers for more than half a century, can they now be used as designations for closely allied genera without involving uncertainty? As this is not an isolated case, but the type of a numerous class, it seems to me that the adoption of the principle that the difference of a single letter in the spelling of names etymologically the same renders several forms of the same word tenable in nomenclature would often prove inconvenient and confusing. In the present case we would have,

¹ Concerning the authority for the name *americanus* see Osgood, Proc. Biol. Soc. Wash., XV, 87, April 25, 1902.

for example, *Alce* as the proper generic designation of a fossil elk, and *Alces* for an allied group of living forms, for which latter both *Alce* and *Alces* have been in more or less general use for more than half a century, according to the predilections of different writers.

II.—SOME OTHER NAMES OF AMERICAN DEER.

Mr. Osgood (Proc. Biol. Soc. Wash., XV, p. 87, April, 1902) has recently called attention to the fact that the authority for the specific name of *Paralces americanus* should be DeWitt Clinton, 1822, instead of Jardine, 1835. In this connection he says he does not admit that the alleged name "[*Cervus dama*] *americana* Erxleben" is recognizable, and that therefore *Cervus americanus* Clinton is available for the Moose, a conclusion that seems beyond question. The specific name *virginianus* (*Dama virginiana*, as I prefer to call it) is thus the proper name of the Common or Virginia Deer.

I cannot, however, quite agree with Mr. Osgood (*l. c.*) that *Cervus mexicanus* Lichtenstein is available, as he contends, for a Mexican deer, since it is preoccupied by a *Cervus mexicanus* of Zimmermann, Gmelin, and other early authors, which is wholly unidentifiable, except in so far as it was based on some malformed antlers from an unknown locality figured and described by Pennant (see *antea*, p. 16). These Mr. Osgood thinks must have been the antlers "of some form of American white-tailed deer."

The case of *Dama* vs. *Odocoileus* (see *antea*, pp. 18-20) has already received some attention from authors, its use being opposed by some, held in abeyance by others (Bangs, Proc. Boston Soc. Nat. Hist., XXXIX, p. 21, April, 1902), and deemed admissible by one (Thomas, Novit. Zool., IX, 136, April, 1902). The fact that its adoption in this sense will prove 'inconvenient,' because used more or less currently for the Fallow Deer of Europe (*cf.* Sclater, Ann. and Mag. Nat. Hist. (7) IX, April, 1902, p. 289), is hardly to be considered. It has, however, been urged against it (Miller, Proc. Biol. Soc. Wash., XV, p. 39, March, 1902) that it stands on the same basis as various other names used by Zimmermann. [June, 1902.]

Mr. Miller cites as an example, "3. *Hyæna*," under *Canis*, but omits to note that the generic name *Hyæna* of authors, as also the species *Hyæna striata*, dates from this same work of Zimmermann's (cf. Trouessart, Cat. Mamm., pp. 317 and 319; W. L. Sclater, Mamm. S. Afr., I, 1900, 83, etc.).¹ *Vulpes* is a case parallel to that of *Hyæna*,² but *Vulpes* Zimmermann = *Vulpes* Brisson. *Jerboa* would be tenable except that, in uncertainty as to date between Zimmermann and Erxleben, it seems best to retain its exact equivalent *Jaculus* of Erxleben. In other cases the examples cited by Mr. Miller are not to be considered as parallel to the case of *Dama*.

III. — THE GENERIC AND SPECIFIC NAMES OF THE PECCARIES.

In 1897, Dr. T. S. Palmer called attention (Proc. Biol. Soc. Washington, XI, p. 174) to the priority of the name *Tayassu* of Fischer (1814) for the Peccaries, this name antedating *Dicotyles* G. Cuvier (1817) by three years. As Dr. Palmer says, Fischer recognized two species in due form under the names *Tayassu pecari* and *T. patira*, of which Fischer gave brief diagnoses. His diagnosis of *T. pecari* shows that the species was the White-lipped Peccary, *Sus albirostris* Illiger, 1815, although he cited "*Sus tajassu* Lin. Gmel. Syst. nat. 111, n. 6,"³ which is not, however, *Sus tajassu* Linn. 1758. His second species, *T. patira*, is the Collared Peccary, *Sus patira* Sonnini (Nouv. Dict. d'Hist. Nat., XVII, 1803, p. 156 = *Sus tajassu* Linn. 1758); thus both species of Peccary at that time known were included in his genus *Tayassu* and identifiably diagnosed.

In 1817 Fischer had reached the conclusion that 'bar-

¹ *Hyæna* Zimmermann, Spec. Zool. Geogr. 1777, 365, 470.

Hyæna striata Zimmermann, Spec. Zool. Geogr. 1777, 366 = *Canis hyæna* Linn. Syst. Nat. 1758, 40.

Hyæna maculata Zimmermann, Spec. Zool. Geogr. 1777, 470 = *Canis crocuta* Erxleben, Syst. Reg. An. 1777, 578.

² *Vulpes* Zimmermann, Spec. Zool. Geogr. 1777, 175, 470. At page 470 three 'species,' or different kinds, are enumerated under *Vulpes*.

³ This reference is erroneous, occurring in neither the 10th nor 12th editions of Linnæus, nor in Gmelin. In other cases "Lin. Gmel." is found to refer to Gmelin and not to Linnæus. Gmelin's *Sus tajassu* is composite, and the characters he gives and most of his citations apply about equally to both species. Hence the reference "*Sus tajassu* Lin. Gmel." does not fix a type. Azara (1801) was the first naturalist, as said by Sonnini, to distinguish and describe the two animals. Sonnini also had personal experience with both in the interior of Guiana, and in 1803 confirmed Azara's discrimination of the two forms. Sonnini also comments at length on the errors of previous authors. See the words "*PATIRA* (*Sus patira*)," and "*PECARI* (*Sus tajassu* Linn.)," in Nouv. Dict. d'Hist. Nat., XVII, 1803, pp. 156, 157, and 180-185.

barous' names should not be retained in zoölogical nomenclature and accordingly changed several of his own names, as well as those of other authors, to conform to what he considered a correct principle of nomenclature. Among the names thus changed is his *Tayassu*, for which he substituted *Notophorus* (Mém. Soc. Imp. des Nat. Moscou, V, 1817, p. 418), considering as the equivalents of this name "*Les Pecaris, Dicotyles*, Cuv. Règne an. p. 237." Thus *Notophorus* is not only a pure synonym of *Dicotyles*, but was intended simply as a substitute for *Tajassu*, of which it is a pure synonym. The only species mentioned in this connection is "*Sus tajassu* Lin. Gmel.," but this can hardly be considered as limiting *Notophorus* to this species, it being given merely as an illustration of the group, as in the majority of the hundred or more other genera recognized in this memoir. Besides, "*Sus tajassu* Lin. Gmel." is unidentifiable, as shown above (see last footnote, p. 162); if *Sus tajassu* Gmel. was intended, the case is not helped, as Gmelin's *Sus tajassu* is composite and stands for all the Peccaries then known.

Hence it was not permissible for Gray in 1868 (P. Z. S., 1868, p. 43) to adopt for his two genera of Peccaries the names *Dicotyles* and *Notophorus*, although Dr. Gill (Proc. Biol. Soc. Washington, XV, p. 38, March 5, 1902) claims that he "was justified by general usage in restricting the name [*Dicotyles*] as he did, although he would have done better to have given a new name to the genus he called *Dicotyles* and [to have] retained the latter name for the one designated *Notophorus*." This, however, is contrary to the principle "once a synonym [homonym] always a synonym." Dr. Merriam was thus quite justified in considering both *Dicotyles* and *Notophorus* as synonyms of *Tayassu*, and in proposing a new name, *Olidosus* (Proc. Biol. Soc. Washington, XIV, 1901, p. 119), for the group of White-lipped Peccaries.

It is further evident that the earliest specific name of the White-lipped Peccary is *pecari* G. Fischer, 1814.

In establishing the genus *Tayassu* Fischer referred to it two species, as follows: (1) *Tayassu pecari*: "T. corpore nigro, maxilla inferiori alba;" and (2) *Tayassu patira*: "T. corpore



nigro, fascia humerali alba" (= *Sus patira* Sonnini, 1803 = *Sus tajacu* Linn., 1758). *Tayassu pecari* G. Fischer, 1814, antedates *Sus albirostris* Illiger, 1815, by one year, and *Dicotyles labiatus* Cuvier, 1817, by three years, for the same animal, namely, the Tagnicati of Azara (Quad. Parag., I, 1801, p. 25), of which the type locality is Paraguay.

The Peccaries, as now recognized (excluding extinct forms), with their principal synonymy, stand as follows:

GENUS *Tayassu* FISCHER.

Tayassu G. FISCHER, Zoognosia, III, 1814, 284.

Dicotyles CUVIER, Règne An. I, 1817, 237 = *Tayassu* Fischer.

Notophorus G. FISCHER, Mém. Soc. Imp. des Nat. de Moscou, V, 1817, 418. Given to replace his previous barbarous name *Tayassu*.

SUBGENUS *Tayassu* (EX FISCHER).

Tayassu MERRIAM, Proc. Biol. Soc. Wash. XIV, 122, July 19, 1901. "Restricted to the *tajacu-angularis* group."

Notophorus GRAY, P. Z. S. 1868, 43. Type and only species, *Sus tajacu* Linn. Preoccupied by *Notophorus* Fischer, 1817 = *Tayassu* Fischer, 1814.

1. *Tayassu tajacu* (Linn.).

Sus tajacu LINN. Syst. Nat. 1758, 50. Based on Piso, Marcgrave Hernandez, etc.; diagnosis distinctive for the Collared Peccary group, but references composite. First properly described and distinguished from the White-lipped Peccaries by Azara, as below; hence it would be well to recognize Paraguay as the type locality, on the basis of Azara's 'restriction.'

Le Taytétou, *Sus tajassu* LINN. AZARA, Quad. Paraguay, I, 1801, 31. = *Sus tajacu* Linn. restricted. Not *Sus tajassu* Erxleben, Gmelin, and other early compilers, which comprised all then known Peccaries.

Sus patira SONNINI, Nouv. Dict. d'Hist. Nat. XVII, 1803, 180 = *Taytétou*, Azara, l. c. p. 31.

Tayassu patira G. FISCHER, Zoognosia, III, 1814, 287 = *Sus patira* Sonnini, 1803.

Dicotyles torquatus CUVIER, Règne An. I, 1817, 237. Based on Azara as above cited, and hence also relates primarily to the Paraguayan animal.

2. *Tayassu angulatus* (Cope).

Dicotyles angulatus COPE, Am. Nat. Feb. 1889, 147, May 25, 1899. Texas.

3. *Tayassu angulatus sonoriensis* (Mearns).

Dicotyles angulatus sonoriensis MEARN'S, Proc. U. S. Nat. Mus. XX, No. 1129, 469 (advance sheet, Feb. 11, 1897). Sonora, Mexico.

4. *Tayassu angulatus humeralis* Merriam.

Tayassu angulatus humeralis MERRIAM, Proc. Biol. Soc. Wash. XIV, 122, July 19, 1901. Armeria, Colima, Mexico.

5. *Tayassu angulatus yucatanensis* Merriam.

Tayassu angulatus yucatanensis MERRIAM, Proc. Biol. Soc. Wash. XIV, 123, July 19, 1901. Tunkas, Yucatan.

6. *Tayassu nanus* Merriam.

Tayassu nanus MERRIAM, Proc. Biol. Soc. Wash. XIV, 102, July 19, 1901. Cozumel Island, Yucatan.

7. *Tayassu crusnigrum* Bangs.

Tayassu crusnigrum BANGS, Proc. Boston Soc. Nat. Hist. XXXIX, No. 2, 20, April, 1902. Boquete, Chiriqui, Panama.

8. *Tayassu torvus* Bangs.

Tayassu torvus BANGS, Proc. Biol. Soc. Wash. XII, 164, Aug. 10, 1898. Santa Marta, Colombia.

SUBGENUS *Olidosus* MERRIAM.

Olidosus MERRIAM, Proc. Biol. Soc. Wash. XIV, 120, July 19, 1902. For "the *albirostris* group."

Dicotyles GRAY, P. Z. S. 1868, 45. Type, *D. labiatus* Cuvier. Pre-occupied by *Dicotyles* Cuvier, 1817 = *Tayassu* Fischer, 1814.

9. *Tayassu pecari* Fischer.

Le Tagnicati, AZARA, Quad. Parag., I, 1801, 25. Paraguay.

Tayassu pecari G. FISCHER, Zoognosia, III, 1814, 285 = *Tagnicati*, Azara, as above cited.

Sus albirostris ILLIGER, Abhand. K. Akad. Wiss. Berlin, 1811 (1815), 108 = *Tagnicati* of Azara.

Dicotyles labiatus CUVIER, Règne An. I, 1817, 238 = *Tagnicati* of Azara.

10. *Tayassu pecari ringens* (Merriam).

Tayassu albirostris ringens MERRIAM, Proc. Biol. Soc. Wash. XIV, 121, July 19, 1901. Apazote, Campeche.

Indeterminate.

Dicotyles minor SCHINZ, Cuvier's Thierreich, IV, 1825, 511. Based on a young specimen from an unknown locality. "Vaterland? Sudamerika. (Frankfurter Museum.)"

IV. — THE PROPER SPECIFIC NAME OF THE WESTERN FOX SQUIRREL.

The Western Fox Squirrel was described by Custis in 1806, under the name *Sciurus ludovicianus*, and this has been supposed to be the earliest name for the species. The next name in point of date has been currently supposed to be "*Sciurus rufiventer* Geoff.," published by Desmarest in 1817 (Nouv. Dict. d'Hist. Nat., X, 1817, p. 103). As the name here stands, it is apparently a manuscript or museum name of Geoffroy's, here first published by Desmarest, and has usually been thus considered. It was, however, first published by E. Geoffroy himself in 1803 (Cat. Mus. d'Hist. Nat., 1803, p. 176), and is based on a specimen of the Western Fox Squirrel sent to him by Michaux. Desmarest apparently redescribed the same specimen. As there has never been any doubt as to the pertinency of Geoffroy's name to this animal, and as it has three years' priority over *ludovicianus* of Custis, it will have to be adopted as the specific designation of the *Sciurus ludovicianus* group.

There is, furthermore, little doubt that Bachman's name *Sciurus texianus* (P. Z. S., 1838, p. 86) should replace *Sciurus limitis* Baird (1855). While Bachman's description appears to have been based on various specimens seen in different European museums (he mentions first a specimen in the Paris Museum said to have been "received from Mexico," and another in the British Museum "obtained at Texas by Mr. Douglas," and still another as received through a friend from "the south-western part of Louisiana"), it applies satisfactorily to the Texas Fox Squirrel, and he gives its range as "extending perhaps from the south-western portions of Louisiana, through Texas into Mexico." He further says it

"would appear to replace the *capistratus* [= *S. niger* Linn.] in the south-western parts of America." While no definite type locality (a thing unknown in those days) is given, the range of Bachman's *texianus*, as stated by him, practically coincides with that of Baird's *limitis*.

With these changes the Western Fox Squirrels will stand as follows:

1. ***Sciurus rufiventer* E. Geoffroy.**

Sciurus rufiventer E. GEOFFROY, Cat. Mus. d'Hist. Nat. 1803, 176.

Sciurus ludovicianus CUSTIS, Barton's Med. and Phys. Journ, II, 1806, 43.

2. ***Sciurus rufiventer texianus* (Bachman).**

Sciurus texianus BACHMAN, P. Z. S. 1838, 86; Charlsworth's Mag. Nat. Hist. III, 1839, 154; Am. Journ. Sci. and Arts, XXXVII, 1839, 295.

Sciurus limitis BAIRD, Proc. Acad. Nat. Sci. Phila. 1855, 331.

3. ***Sciurus rufiventer neglectus* (Gray).**

Macroxus neglectus GRAY, Ann. and Mag. Nat. Hist. (3) XX, Dec. 1867, 425.

Sciurus ludovicianus neglectus NELSON, Proc. Biol. Soc. Wash. XIII, 1900, 170.

Sciurus niger var. *cinereus* ALLEN, Mon. N. Am. Mamm. 1877, 718.

Sciurus ludovicianus vicinus BANGS, Proc. Biol. Soc. Wash. X, 1896, 150.

V.—POSTSCRIPT.

FURTHER NOTE ON *Notophorus*.—Since the foregoing was passed for the press I have received pages 153–156 of Vol. XV of the 'Proceedings' of the Biological Society of Washington, dated June 20, 1902, which contain, among other notes, a short paper by Mr. Oldfield Thomas, entitled 'The Generic Names of the Peccaries, Northern Fur Seal, and Sea Leopard.' I am pleased to see that Mr. Thomas and I agree in considering *Dicotyles* to be "strictly synonymous" with *Tayassu*. I am surprised, however, at his treatment of *Notophorus*, by which, he says, "Fischer no doubt intended merely to replace his earlier but barbarous *Tayassu* by a classical term, but he happened to mention only one species belonging to it, viz.: '*Sus tajassu* Lin. Gmel.' This therefore," he continues, "would not only be its type, but would by elimination restrict *Tayassu* and *Dicotyles* to the other species mentioned in the respective original descriptions of those genera. Dr. Merriam's

Olidosus would thus not be required." He further adds: "But while Linnæus's *Sus tajacu* was the collared Peccary, Fischer's *Sus tajassu* was, as clearly shown by the synonymy in his *Zoognosia*, the white-lipped species, and that, therefore, must count as the type of *Notophorus*, and by elimination bring *Tayassu* on to the true *T. tajacu*." In this way he retains *Tayassu* for the Collared Peccaries and *Notophorus* for the White-lipped Peccaries.

As already shown (*antea*, pp. 162-165), this is quite different from my interpretation of the case, and it seems to me is a violation of the principle underlying his treatment of the case of *Dicotyles*. As shown above, Fischer, in the '*Zoognosia*,' gave practically new names to the two species of Peccary then known, one being entirely new and the other ex Sonnini. If Fischer had mentioned either one of these names under *Notophorus* in replacing *Tayassu*, Mr. Thomas's contention would be perfectly sound. But instead of doing this he simply gave "*Sus tajassu* Lin. Gmel.," which means nothing in a type sense, because, as shown above, it is unidentifiable. As Mr. Thomas admits, it is not the *Sus tajacu* of Linnæus; if it is the *Sus tajassu* of Gmelin, it is a composite, embracing all the Peccaries then known. Furthermore, Fischer's reference, "*Syst. nat.* 111, n. 6," does not fit either. As *Notophorus* was obviously given to replace *Tayassu*, as shown by the references under it to both *Tayassu* and *Dicotyles*, it should be treated just as Mr. Thomas treats *Dicotyles*. It would be, I think, contrary to sound principles of nomenclature to identify the bare "*Sus tajassu* Lin. Gmel." under *Notophorus* with Fischer's *Tayassu pecari* of the '*Zoognosia*,' simply because Fischer in the latter connection happens to cite a "*Sus tayassu* Lin. Gmel., *Syst. nat.* 111, n. 6," which does not occur at either place indicated, and is apparently both composite and indeterminate.

In this connection reference may be made to Mr. Thomas's remarks on the names *Callorhinus* and *Callirhinus*, and *Stenorhinchus*, *Stenorrhynchus* and *Stenorynchus*, which are considered as " 'permissible variants' of one compound," each valid for use in nomenclature, but only so far as to call attention to the preceding remarks (pp. 159-162) under *Alce* and *Alces*.



(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
“ II, 1887-90.....	“ 4.75	“ “ “ II, 1899 “	2.00
“ III, 1890-91.....	“ 4.00	“ “ “ III, 1900 “	2.00
“ IV, 1892.....	“ 4.00	“ “ “ IV, 1901 “	1.75
“ V, 1893.....	“ 4.00	“ “ (Complete). “	5.00
“ VI, 1894.....	“ 4.00	“ XII, 1899.....	“ 4.00
“ VII, 1895.....	“ 4.00	“ XIII, 1900.....	“ 4.00
“ VIII, 1896.....	“ 4.00	“ XIV, 1900.....	“ 4.00
“ IX, 1897.....	“ 4.75	“ XV, Part I, 1901 “	3.00
“ X, 1898.....	4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

A Preliminary Study of the South American Opossums of the Genus Didelphis.

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XVI, ARTICLE XX, pp. 249-279.

New York, Aug. 18, 1902.

The Knickerbocker Press, New York

**Article XX.—A PRELIMINARY STUDY OF THE SOUTH
AMERICAN OPOSSUMS OF THE GENUS
DIDELPHIS.**

By J. A. ALLEN.

INTRODUCTORY.

About a year since, I published ¹ 'A Preliminary Study of the North American Opossums of the Genus *Didelphis*.' Shortly after, I had opportunity to study the material relating to this genus contained in the British Museum, through the kindness of Mr. Oldfield Thomas, the Curator of Mammals. The present paper is based almost wholly on the material thus generously placed at my disposal. It includes specimens from many different and widely separated localities, some of which are represented by a considerable number of specimens. Among them are practically topotypes of Azara's 'Micouré premier,' and of the forms described by Lund and von Ihering from Southern Brazil. I also had the pleasure of examining the types of Bennett's *Didelphis californica* and *D. breviceps*.

In a group so notoriously subject to variation due to age and individual differentiation, it is necessary to examine a very large amount of material in order to reach satisfactory results. That now available is only sufficient for a preliminary survey of the field, and the conclusions reached are necessarily tentative, and are presented with some hesitation, although the material studied by me at the British Museum, combined with that in the American Museum of Natural History, is probably greatly in excess of that examined by any previous investigator of the group. Having in my former paper considered in some detail the subject of sexual and individual variation, and variations due to age, it is sufficient in the present connection to say that the South American forms, as would be expected, vary in these respects

¹ This Bulletin, XIV, pp. 149-188, pll. xxii-xxv, June 15, 1901.

in the same manner and to the same degree as the northern members of the group.

HISTORICAL RÉSUMÉ AND NOMENCLATURE.

As in the case of the North American forms, the South American present puzzling questions of synonymy, some of which have already in part been considered.¹ The first name applied as a species name to any member of the restricted genus *Didelphis* was *marsupialis* (Linnæus, Syst. Nat., 1758, p. 54), given to a group of forms comprising all the large opossums then known. Owing to this fact various writers, from Temminck and Waterhouse down to the present time, have treated the name as indeterminate. There is no doubt, however, of its exclusive relation to the large opossums of the restricted *Didelphis* group; the trouble is satisfactorily to fix the name upon some one of the several components of the original *marsupialis*.

At one time I favored restricting the name *marsupialis* to the Virginia opossum (this Bulletin, XIII, 1900, p. 187), on the ground that the reference to Tyson was the first of the citations given by Linnæus that was positively identifiable.

Later (*op. cit.*, XIV, 1901, p. 164), through the application of the principle of elimination, I favored fixing the name on the large Mexican species, on the basis of the Linnæan reference to Hernandez, the large Guiana form having been taken out of the group by Zimmermann in 1780, the Virginian species by Kerr in 1792, the Paraguayan and South Brazilian respectively in 1816 and 1826, leaving only *californica* of Bennett of the members originally composing it. Mr. Oldfield Thomas, however, has objected to this (Amer. Nat. XXXV, Feb. 1901, p. 144; Ann. and Mag. Nat. Hist. (7) VIII, Aug. 1901, p. 153), on the ground that Linnæus's only reference in the sixth edition of the 'Systema Naturæ,' and the first in order of sequence in the tenth edition, is to Seba, and that Seba's animal is beyond doubt the ordinary large dark opossum of northeastern South America, subsequently named *Didelphis karkinophaga*. Although at one time I was

¹ Cf. this Bulletin, XIII, 1900, pp. 185-187.

not convinced that Seba's animal (pl. xxxix) was identifiable a reëxamination of the case leads me to accept Mr. Thomas's conclusion.¹

The *Didelphis marsupialis* case being settled, the next names in order of time for the South American large opossums are *D. karkinophaga* Zimmermann, 1780, *D. carcinophaga* Boddaert, 1784, and *D. cancrivora* Gmelin, 1788, all of which were based on Buffon's 'le Crabier' from Cayenne, and are therefore all synonyms of *D. marsupialis* as now restricted. Next in order of date are Oken's names for the large opossums of both North and South America, of which he recognized five species, giving new names to four of them, as follows:

(1) *Did[elphys] cancrivora* (Lehrbuch der Naturgeschichte, Theil III, Abt. ii, 1816, p. 1146). Based on Buffon's 'le Crabire,' and hence = *Didelphis cancrivora* Gmelin.

(2) *Did. paraguayensis* (l. c., p. 1147). Based primarily on the 'Micouré premier' of Azara, with which he correctly associates the 'Tai-ibi Brasiliensibus' of Marcgrave. = *Didelphis azaræ* Temminck, 1825.

(3) *Did. austro-americana* (l. c., p. 1148). Relates mainly to the large South American opossums of the *Didelphis* group, but also includes references to species of *Metachirus* and *Caluromys*. = *Didelphis marsupialis* Linn. mainly.

(4) *Did. mes-americana* (l. c., p. 1152). Relates primarily to the Mexican 'Tlaqatzin,' or to the "Tlaqatzin in Neu Spanien (nördl. Mexico), auch in andern Gegenden Amerikas unter verschiedenen Namen." These other names and regions include the "Çarigueya an der Küste von Brasilien, Jupatiima im Innern, Taibi in Paraguay," etc., of South America, and the 'Manicu' of the lesser Antilles, with references also to Florida and Darien. Although *D. mes-americana* is thus composite,

¹ Mr. Thomas says (Ann. and Mag. Nat. Hist. (7) VIII, Aug. 1901, p. 153): "The evidence of the sixth edition of the 'Systema,' where Seba, and Seba only, is quoted, shows what animal Linnaeus had in his mind when speaking of *marsupialis*." This statement can hardly be taken strictly, as in the sixth edition (p. 10), Linnaeus did not use the name *marsupialis*, but simply *Didelphis*, of which he recognized two groups (species?), namely, "1. *Didelphis mammis intra abdomen*," and "2. *Didelphis mammis extra abdomen*," citing Seba only under each. Under the first he gives "Seba. thes. I, t. 36, f. 1, 2 & t. 39." The first plate reference here cited later became the exclusive basis of Linnaeus's *Didelphis opossum* (cf. Thomas, Cat. Marsup. and Monotr., 1888, p. 329), while the other became in part the basis of his *D. marsupialis*. He thus, in the tenth edition, made two species of his No. 1 of the sixth edition, citing of Seba's plates only pl. xxxix under his *D. marsupialis*, and in so doing restricted his *marsupialis*, so far as Seba is concerned, to pl. xxxix.

he first describes at length the large *Didelphis*, or 'Tlaqatzin,' of Mexico, with which he constantly compares the other forms described with equal fulness later, showing that the Mexican 'Tlaqatzin' was the animal he 'had in his mind' when describing *mes-americana*. Hence there seems to be no good reason for not applying the usual rule to the present case and restrict the name *mes-americana* to the large opossum of 'northern Mexico' ("nördl. Mexico"), since it long antedates Bennett's and other later names for the same animal.

(5) *Did. boreo-americana* (l. c., p. 1158). Relates exclusively to the opossum of the eastern United States ("nur in Virginien, Lusiana, Kanada"; also "im Lande der Illiner"). Hence = *Didelphis virginiana* Kerr.

The first intelligent account of the large opossums, based on the comparison of considerable material, was published by Temminck in 1825 (Mon. Mamm., 1825-1827, Deux. Mon., 1825, pp. 27-35), who clearly distinguished three species, and properly allocated their principal synonyms. The first is his *Didelphis virginiana*, correctly characterized and properly assigned to North America "depuis le Mexique jusque dans les provinces septentrionales des États-Unis." The second is his *Didelphis azaræ*, described from specimens seen in European museums, and identified with the 'Micouré premier, ou Micouré proprement dit' of Azara, and which he says is found "au Brésil, où il est très-répandu," and, of course, in Paraguay. His third species is *Didelphis cancrivora*, which he identifies with "le Grand Philander oriental de Seba, Thes. Vol. I, p. 64, tab. 38, fig. 1 [*lege* tab. 39];" he says it is found over a great part of South America, but especially in "le Guiane et le Brésil." It is Buffon's 'le Crabier,' which he cites, as also Boddaert's and Gmelin's names based thereon; but he makes no reference, under any of his species, to *D. marsupialis* Linn. Yet in citing Seba, he cites the primary basis, according to Thomas (*cf. antea*, p. 251, footnote), of Linnæus's *marsupialis*.

In his otherwise creditable notice of this group of opossums Temminck makes the singular mistake of reversing the colors of the ears of his *D. azaræ*, which he says are yellow at

the base with the rest black,¹ whereas just the opposite is true, as noted by Wagner and Hensel.

In 1826 Wied (Beitr. zur Naturg. von Brasilien, II, 1826, pp. 387-400) recognized what he considered to be two species of true *Didelphis* from southern Brazil, one of which he identified with *D. marsupialis* Linn., and the other he provisionally described as new, under the name *Didelphys aurita*, on the basis of a single female specimen from Villa Vigoza, Rio Peruhype, in southeastern Brazil. Here is named for the first time the large black-eared opossum of southern Brazil, to which both these names relate.

In 1841 Lund (Kongl. Dansk. Vidensk. Selsk. Afhandl., VIII, 1841, p. 236) described the *azaræ* type of opossum occurring at Lagoa Santa as *Didelphis albiventris*, and a year later Wagner (Arch. f. Naturg. 1842, i, 358) renamed the same animal, from practically the same region, *Didelphys pæcilotis*, which latter name has been generally taken instead of Lund's, especially by German writers. In 1844 Schinz (Syn. Mamm., 1844, p. 504), based the name *Didelphys pæcilonota* on Rio Grande do Sul specimens, while Ihering has recently given the name *Didelphys lechei* to the dark phase of the *azaræ* type from the same region, and the name *Didelphys koseritzi* to the dark phase of the *aurita* type of the same region.

In 1900 I described (this Bulletin, XIII, pp. 192, 193) two subspecies of the *marsupialis* group from, respectively, eastern and western Colombia, under the names *D. karkino-phaga colombica* and *D. k. caucæ*; and also (*l. c.*, p. 191) a black form of the *D. azaræ* (= *paraguayensis*) group, from southeastern Peru, under the name *Didelphis pernigra*. At this time I had not previously seen specimens of the *D. azaræ* group, and was hence strongly impressed with its distinctness from any of the forms of *Didelphis* then known to me. I was therefore greatly surprised, a year later, to find it only a form of the so-called *D. azaræ*.

SPECIES AND SUBSPECIES OF DIDELPHIS.

The South American forms of *Didelphis* are separable

¹ See *op. cit.*, footnote to p. 27, and the text, pp. 30 and 31.

into two distinct groups, through well-marked differences of size, coloration, and cranial characters, namely, the *D. marsupialis* group and the *D. 'azaræ'* or *paraguayensis* group. The first ranges from Panama southward, extending down the Pacific coast as far, at least, as northern Peru, and also across northern South America from western Colombia to Trinidad, and southward east of the Andes, to Bolivia, northern Argentina, Uruguay, and southern Brazil. It is not, however, the same throughout this vast range, but is separable into a number of well-marked forms, the extremes of which, while widely diverse, are connected by intergradation. The smallest forms of this group are considerably larger than the largest forms of the *paraguayensis* group. The coloration is also notably different, the *marsupialis* group having wholly black ears¹ and very indistinct head markings, while in the *paraguayensis* group the ears are either wholly or in large part flesh-colored, and the black head markings are generally very sharply defined on a white ground. In the latter the skull is relatively shorter and less attenuated, the 4th premolar in both jaws is relatively much larger and thicker or more peg-shaped, and the superior border of the zygoma is formed posteriorly by the squamosal instead of in part by the posterior extension of the malar. This character alone is so constant and well marked as to readily differentiate the skulls of the two forms.

The *paraguayensis* group is found from the Rio de la Plata northward to central Minas Geraes, Matto Grosso, and western Bolivia, and thence northward in the Andean region through Peru and Ecuador, reaching the coast at Callao and probably elsewhere in Peru, and thence ranging eastward through the Eastern Cordillera in Colombia and Venezuela to Merida. It appears to be absent from western and northern Colombia, northern and eastern Venezuela, including the Orinoco basin, and from the whole Amazonian region east of the Andean foothills, and hence from all of central and northern

¹ By 'ear' is meant, in this connection, the external ear or pinna only, exclusive of the meatus, which latter often varies individually in specimens from the same locality in all the forms of the *marsupialis* and *mes-americana (californica)* groups, in which the external meatus may be yellowish while the pinna is wholly black.

Brazil. It is thus an animal of the Cordilleras, the mountainous portion of southern Brazil, and the more southern pampas. This, at least, is the evidence afforded by the present material and the literature of the subject. The two groups thus overlap each other geographically only in southern Brazil, northern Argentina, and in parts of Bolivia, and again at the northward over limited portions of Colombia and Venezuela.

In respect to the distribution of these two groups in Ecuador and Peru, it is of interest to note that the late Mr. P. O. Simons, on his collecting trip for the British Museum during the years 1898-1901, from the coast region of Ecuador southward and eastward to southeastern Peru and the adjoining part of Bolivia, sent only specimens of the *marsupialis* group from the low coast region west of the Andes, from the Department of Piura in Peru northward to Guayaquil, and only specimens of the *paraguayensis* group from the interior of Ecuador, Peru, and Bolivia.

The *marsupialis* group is not very sharply separable from the large opossums of Mexico and the United States. Neither intergradation between the North American and South American forms, nor the reverse, has as yet been established, owing to the lack of material from large portions of Central America. It is evident, however, that the relationship is close among all these forms, in comparison with their sharp differentiation from all the members of the *paraguayensis* group.

The extraordinary amount of variation in individuals of the same subspecies, from even the same locality, in respect to size and coloration, in the relative length of the tail and in cranial characters, combined with dimorphic conditions in coloration, renders the discrimination of local forms a very difficult matter, and at best, with the limited material as yet available for examination, exceedingly unsatisfactory. Beginning at the northward, we have, first, the large *virginiana* type, white-headed, short-tailed, and light-colored, with the margin of the ears and the tips of the toes and much the greater part of the tail white, and never, so far as known, running into a melanistic phase; in its southern subspecies, *pigra*, the underfur is more extensively tipped with black,

the tail becomes slightly longer, the white on the ears, tail and toes is reduced, and on the latter is of irregular presence, and there is a decided tendency to melanism. A very similar dichromatic form occurs in southern Texas, with, however, differently shaped nasals. In Mexico the same general type prevails, but the head is much darker, the tail is generally, but not always, much longer, the size varies with locality, as also do other features. This same general style, with local variations, ranges over Central and northern South America, being everywhere dichromatic, and over eastern South America to Uruguay, with, however, over this last area, a tendency to a better-defined pattern of head markings. Adopting the changes in nomenclature for the Mexican and Paraguayan types proposed above, the members of the genus *Didelphis* will stand as follows:

List of the Species and Subspecies.

I. MARSUPIALIS GROUP.

1. *Didelphis virginiana* Kerr. — Eastern United States, except the Gulf coast.
2. *Didelphis virginiana pigra* Bangs. — Southeastern Georgia, Florida, and the Gulf coast region to Texas.
3. *Didelphis mes-americana* Oken.
Didelphis marsupialis ALLEN, Bull. Am. Mus. Nat. Hist. XIV, 1901, 166. Not *D. marsupialis* Linn. restr.
 Mexico, from Puebla and Guerrero northward. Probably should be separated into several local forms.¹
4. *Didelphis mes-americana texensis* Allen. — Rio Grande region of Texas and Mexico.

¹ In this connection it may be of interest to note the results of an examination of the types, so far as they are extant, of Bennett's *Didelphis californica* and *D. breviceps*.

A skull in the British Museum of one of the two specimens on which *D. californica* Bennett was based (the skins are not extant) resembles, in the character of the nasals, the Vera Cruz type of Mexican opossum, named by me *D. m. tabascensis*. As, however, Mr. Bennett's material, described as "from that part of California which adjoins Mexico," of which this formed a part, appears to have been unquestionably Sonoran, it seems better not to disturb the name already bestowed upon the east Mexican form; especially in view of the inconstancy of the form of the nasals in all the forms. The alleged type skull is labelled: "Taken from one of the Types of *D. californica* Bennett, P. Z. S. 1833, p. 40. No. 1141a. Brit. Mus. Reg. 55-12-26-190. *Didelphys marsupialis*, L. Loc. California. Ex. Coll. Zool. Soc."

The type of *D. breviceps* Bennett, still extant in the British Museum, is a rather young specimen. On removal of the skull from the skin for examination it was found to agree in the form of the nasals with Sinaloa specimens of corresponding age.

5. *Didelphis mes-americana tabascensis* Allen. — Southern Mexico and Guatemala.
6. *Didelphis yucatanensis* Allen. — Yucatan.
7. *Didelphis yucatanensis cozumelæ* Merriam. — Cozumel Island, Yucatan.
8. *Didelphis richmondi* Allen. — Nicaragua.
9. *Didelphis marsupialis* Linn. (restr.). — Guiana and eastern Venezuela.
10. *Didelphis marsupialis insularis*, subsp. nov. (p. 259). — Island of Trinidad and Lesser Antilles.
11. *Didelphis marsupialis colombica* Allen. — Eastern Colombia and (probably) northern Venezuela.
12. *Didelphis marsupialis caucae* Allen. — Southwestern Colombia.
13. *Didelphis marsupialis etensis*, subsp. nov. (p. 262). — Pacific coast region, west of the Andean chain, from northern Peru to Panama.
14. *Didelphis marsupialis battyi* Thomas. — Coiba Island, Panama.
15. *Didelphis marsupialis aurita* Wied. — Southern Brazil.

II. PARAGUAYENSIS GROUP.

16. *Didelphis paraguayensis* Oken. — Northern Argentina, Paraguay, and southern Brazil.
17. *Didelphis paraguayensis pernigra* Allen. — Southeastern Peru, into Bolivia.
18. *Didelphis paraguayensis andina*, subsp. nov. (p. 272). — Andean region of northern Peru and Ecuador.
19. *Didelphis paraguayensis meridensis*, subsp. nov. (p. 274). — The eastern Cordilleras of Colombia and Venezuela.

DESCRIPTIONS OF THE SOUTH AMERICAN SPECIES AND SUBSPECIES.

Didelphis marsupialis Linn.

Philander, maximus, orientalis, SEBA, Thesaurus, I, 1734, 64, pl. xxxix. "Amboine," in error = Guiana.

Didelphis mammis intra abdomen LINN., Syst. Nat. ed. 6, 1748, 10 = *Philander* of Seba, pll. xxxvi, figs. 1, 2, xxxix (part).

[August, 1902.]

Didelphis marsupialis LINN., Syst. Nat. ed. 10, I, 1758, 54 (part); ed. 12, I, 1776, *72 (part). — ERXLEBEN, Syst. Reg. Anim. 1777, 73 (part). — GMELIN, Syst. Nat. I, 1788, 105, ex Schreber. — THOMAS, Amer. Nat. XXXV, Feb. 1901, 144, (nomenclature); Ann. and Mag. Nat. Hist. (7) VIII, Aug. 1901, 153 (British Guiana, nomenclature).

Didelphys marsupialis SCHREBER, Säug. III, 1778, 536 (mainly; not pl. cxlv*, which is *D. virginiana*.) — Also in part of most later compilers.

Didelphys marsupialis var. *typica* THOMAS, Cat. Marsup. and Monotr. 1888, 323 (part).

Le Crabier, BUFFON, Hist. Nat. Suppl. III, 1776, 272, pl. liv. Cayenne.

Didelphis karkinophaga ZIMMERMANN, Geogr. Gesch. II, 1780, 266 = *Le Crabier*, Buffon. — ALLEN & CHAPMAN, Bull. Am. Mus. Nat. Hist. IX, 1897, 30 (part). — ALLEN, Proc. Biol. Soc. Wash. XIV, 92, June 19, 1901 (nomenclature); Bull. Am. Mus. Nat. Hist. XIV, 1901, 151, 153 (in text).

Didelphis cancrivora GMELIN, Syst. Nat. I, 1788, 108 = *Le Crabier*, Buffon. — DESMAREST, Nouv. Dict. d' Hist. Nat. VI, 1803, 458. — TEMMINCK, Mon. Mamm. 2° Mon. 1825, 32, pl. v, skull and skeleton.

Didelphys cancrivora WAGNER, Schreber's Säug. Suppl. III, 1843, 41; V, 1855, 225. — WATERHOUSE, Nat. Hist. Mamm. I, 1846, 473. — CABANIS, Schomburgk's Reisen Brit.-Guiana, III, 1848, 777.

Type Locality.—Guiana.

Geographical Distribution.—Guiana, eastern Venezuela, and probably southward into northern Brazil. Exact range not known.

Above yellowish white, varied with black; underfur yellowish white, the tips of the longer fibres blackish; overhair stiff, bristly, white basally, black on apical half. A narrow blackish eyering, but no other facial markings, the whole head being dingy yellowish white with the tips of the hairs blackish, giving a slight general dusky wash. Ventral surface yellowish white, with a slight dusky brown wash, formed by the tips of the longer hairs. Fore and hind limbs, including upper surface of feet, deep brownish black. Ears large, wholly black. Tail black for the basal two-thirds of the naked portion, apical third light flesh-color.

Measurements. — Two males from the Kanuka Mountains, British Guiana, measure: Total length, 762 and 775 mm.; head and body, 381 and 381; tail, 381 and 394; hind foot, 57; ear, 57. A female (same locality) measures: Total length, 712; head and body, 330; tail, 382; hind foot, 51; ear, 51. Another female from Mapures, Venezuela, measures: Total length, 776; head and body, 357; head and body, 419; hind foot, 54; ear, 52. *Skull:* Three males, total length, 101 (95–107); basal length, 92 (86–98); nasals, 48 (45–50); zygomatic breadth, 51 (48–55); postorbital breadth, 22 (20–24.5); postorbital con-

striction, 11 (11-11.5); occipital breadth, 29; breadth at canines, 18.7 (17-20); upper toothrow, 33.9 (33-35.3); molar series, 19.3 (19-20).

The above description is based on an adult male, from Better Hope, Demerara. Three other specimens from the Kanuka Mountains (alt. 300 feet), Guiana, agree in coloration and skull characters, except that one is in the gray phase with whitish overhairs, the others being in the black phase. A specimen from Mapures, Venezuela, is also similar, but has the underfur stained basally with ochraceous brown or gamboge, and the long overhair is mostly white, but some of it is apically black, as in the black phase.

Specimens examined:

Guiana: Better Hope, Demerara, 1 specimen; Kanuka Mountains, altitude 300 feet, British Guiana, 3 specimens.

Venezuela: Mapures, 1 specimen.

Total, 5 specimens, coll. British Museum.

The true *marsupialis* of Guiana and the Lower Orinoco region differs markedly—through its lighter coloration, absence of decided markings on the head, and its generally whitish color, smaller size, and longer tail—from any of the forms of northern South America, and still more from *D. aurita* of southern Brazil, as will be noticed later.

Didelphis marsupialis insularis, subsp. nov.

Didelphys marsupialis THOMAS, Journ. Trinidad Field Nat. Club, I, April, 1893, 11.

Didelphis marsupialis ALLEN & CHAPMAN, Bull. Am. Mus. Nat. Hist. V, 1893, 230.

Didelphis karkynophaga ALLEN & CHAPMAN, Bull. Am. Mus. Nat. Hist. IX, 1897, 23 (Trinidad), 30 (Dominica). — ALLEN, *ibid.* XIV, 1901, 186 (measurements).

Type, No. $\frac{7749}{124}$, ♂ ad., Caparo, Trinidad, March 19, 1894; coll. Frank M. Chapman.

Head almost wholly yellowish white to nape, with a very narrow brownish eyering; in fresh long pelage the hairs on top of head slightly tipped with dusky, giving a slight dingy tone, and sometimes tending to form a dusky median band over the top of the head. Underfur almost wholly yellowish white, a few of the coarser fibres tipped with blackish, mainly along the middle of the back; at base over nape and shoulders brownish ochraceous; long stiff overhair wholly white in some individuals, wholly black in others, or black and white mixed in still others. Below pale yellow or yellowish white, the tips of a few of the longest hairs blackish, but so few as scarcely to affect the general coloration. Fore limbs from elbows, and hind limbs from knees, blackish brown, proximal portion like the body. Ears blackish

brown; proximal third of naked portion of tail blackish brown, apical two-thirds flesh-color or whitish. Facial markings reduced to a very narrow eyering; head as light as in *D. virginiana*.

Measurements. — Four males measure: Total length, 874 mm. (810-955); head and body, 452 (385-500); tail, 446 (425-465); hind foot, 60.5 (55-66); ear, 60 (55-65). Three females measure: Total length, 807 (740-850); head and body, 406 (350-468); tail, 401 (382-430); hind foot, 57 (55-58); ear, 53 (52-53). *Skull*: Three males, total length, 107 (101-110); basal length, 97 (91-101); length of nasals, 49 (47-50); zygomatic breadth, 63 (61-63.5); postorbital breadth, 22.3 (21-24); occipital breadth, 31.3 (30-32); breadth at canines, 19.7 (19-20); upper tooththrow, 34.3 (33-36).

Specimens examined:

Trinidad: Princetown, Caparo and Caura, 10 specimens.

Island of Dominica: 3 specimens.

Island of Grenada, 2 specimens.

Island of St. Vincent, 2 specimens.

Total, 17 specimens, — 11 coll. Amer. Museum, 6 coll. Brit. Museum.

A series of ten specimens from various near-by localities in Trinidad (Princetown, Caura, and Caparo) are very uniform in coloration and other characters, and are readily distinguishable from true *marsupialis* from Guiana by their much lighter coloration and larger size. They vary chiefly among themselves in the color of the stiff overhair, which may be either white or black, or variously mixed in the same individual. St. Vincent, Grenada, and Dominica specimens are similar, and were most likely derived from the Trinidad stock, having doubtless been introduced into these islands from Trinidad.

***Didelphis marsupialis colombica* Allen.**

Didelphis karkinophaga BANGS, Proc. N. Engl. Zool. Club, I, 89, Feb. 23, 1900. Santa Marta region, Colombia.

Didelphis karkinophaga colombica ALLEN, Bull. Am. Mus. Nat. Hist. XIII, 1900, 193, Oct. 23, 1900 (Santa Marta, Colombia); *ibid.* XIV, 1901, 186 (measurements).

Type locality, Santa Marta, Colombia.

Geographical Distribution. — Eastern Colombia, south to Bogota, and probably into northern Venezuela.

Similar to true *D. marsupialis* but larger, with smaller ears, and very much darker in coloration; head much darker with a tendency to indistinct median and eye stripes, the latter more distinctly developed behind the eyes; whole upper surface of head with a general blackish grizzled effect; ventral surface buffy, overlaid with a black-

ish grizzle produced by the longer black-tipped hairs; ears and feet wholly brownish black; basal half of naked portion of tail black, the rest yellowish white or flesh-color.

Measurements. — Five males, all from near Santa Marta, Colombia, measure: Total length, 822 mm. (710-980); head and body, 417 (355-456); tail, 405 (330-483); hind foot, 60 (57-68). Two females: Total length, 768 (673-863); head and body, 377 (318-406); tail, 406 (355-457); hind foot, 56 (54-57). *Skull:* 4 males, total length, 98 (94-107); basal length, 90 (85-99); nasals, 15 (14.5-16); zygomatic breadth, 52 (48.5-57); postorbital breadth, 21; postorbital constriction, 11.1 (10-12); occipital breadth, 29 (28-31); breadth at canines, 19 (16-21); upper toothrow, 35 (34-36); molar series, 19.4 (19-20).

Specimens examined:

Colombia: Santa Marta and vicinity, 8 specimens, coll. Amer. Museum. Also additional specimens in coll. H. H. Smith. Near Bogota, 2 specimens, coll. British Museum.

Total, 15 specimens.

This form, based originally on a series of 8 specimens from the immediate vicinity of Santa Marta, Colombia, is intermediate in size between *D. marsupialis* and *D. m. insularis*, being very much larger than the former and considerably smaller than the latter, with much smaller ears. It is very much darker in coloration than true *marsupialis*, which in turn is very much darker than *insularis*, with which latter comparison is unnecessary. As in the other forms of the *marsupialis* group, the long stiff overhair may be either all white, or the apical portion all black, or the two kinds of hair may be combined in various degrees of abundance in the same individuals.

***Didelphis marsupialis caucæ* Allen.**

Didelphis karkinophaga caucæ ALLEN, Bull. Am. Mus. Nat. Hist. XIII, 1900, 192, Oct. 23, 1900 (Cali, Upper Cauca Valley, Colombia); *ibid.* XIV, 1901, 186 (measurements).

Type locality, Cali, Upper Cauca Valley, southwestern Colombia.

Geographical distribution. — Southwestern Colombia, east of the Western Cordillera.

Similar to *D. m. colombica*, but much darker throughout; a rather distinct blackish eyering, and often a well-defined median black stripe on the head, running from the nape forward, narrowing and terminating at a point on a line a little behind the eyes; rest of the head

dingy yellowish white, strongly washed with blackish; ventral surface buffy white, washed, often strongly, with blackish. Size and proportions about as in *colombica*, except that the ears are much larger.

Measurements. — Two adult males from the type locality measure, respectively: Total length, 770 and 740 mm.; head and body, 410 and 370; tail, 360 and 370; hind foot, 53 and 58. A female from the same locality measures: Total length, 740; head and body, 370; tail, 370; hind foot, 58. *Skull*: 4 adult male skulls from Cali measure as follows: Total length, 102.5 (94–107); basal length, 90.3 (85–99); nasals, 45 (42–50); zygomatic breadth, 52 (48.5–57); postorbital breadth, 20.5 (19–21); postorbital constriction, 11 (10–12); occipital breadth, 29.1 (28–31); breadth at canines, 19 (16–21); upper toothrow, 35 (34–36); molar series, 19.6 (19–20).

Specimens examined:

Colombia: 17 specimens, mostly immature, from Cali, Upper Cauca Valley; coll. Amer. Museum.

This subspecies is represented by 17 specimens, all from the vicinity of Cali, Cauca Valley, Colombia, of which 11 are adult and 6 immature. The immature specimens have the ears either wholly flesh-color (in the very young) or part-colored, black at base and tipped more or less broadly with flesh-color, according to age. Unfortunately only a few of the specimens were measured in the flesh. The adults are mostly in the black phase, five being wholly black, two mostly black, and four gray; of the young, three are black and three gray.

***Didelphis marsupialis etensis*, subsp. nov.**

? *Didelphis karkinophaga caucæ* BANGS, Amer. Nat. XXXV, 1901, 633. San Miguel Island, Panama.

Type, No. 18986 (formerly No. 0-3-1-86, Br. Mus.), ♂ ad., Eten, Piura, Peru (alt. 50 feet), Oct. 2, 1899; coll. P. O. Simons, No. 628.

Geographical Distribution. — The low coast-belt of Ecuador and Peru, bordering the Gulf of Guayaquil, and probably northward, near the coast, to Panama.

Similar in general coloration to *D. m. caucæ*, but larger and blacker. In fresh pelage the rostral region, as far back as the eyes, is dingy brownish white, the hairs being tipped with blackish; a whitish streak over each eye, the two meeting in front of the eyes; cheeks dingy whitish; middle of the head, from between the eyes posteriorly, blackish, the pelage whitish basally with long black tips; a blackish

eyering, continued both in front and behind the eyes as an ill-defined blackish spot; ears and feet black, as usual in the group; naked part of the tail black for the basal third, the rest yellowish white. Coloration in general as in all of the darker forms of the *marsupialis* group.

Measurements. — Four adult males from Eten measure as follows: Total length, 829 (730–930); head and body, 425 (390–480); tail, 399 (330–450); hind foot, 61 (56–67); ear, 56 (52–60). A female from the same locality measures: Total length, 769; head and body, 395; tail, 374; hind foot, 57; ear, 54. *Skull:* Six adult male skulls measure as follows: Total length, 110.5 (102–122); basal length, 102.4 (92–118); nasals, 53 (45–57.5); zygomatic breadth, 59.5 (58–64); postorbital breadth, 24.2 (23–28); postorbital constriction, 11.5 (11–12); occipital breadth, 33.8 (31–35.5); breadth at canines, 21.8 (19–25); upper toothrow, 35.5 (34.5–36); molar series, 19.4 (19–20).

Specimens examined:

Peru: Eten and Piura, Depart. of Piura, 8 specimens; coll. Brit. Museum.

Ecuador: Puna Island, 2 specimens; Guayaquil, 2 specimens; St. Javier, 1 specimen; Jambilar, 1 specimen; coll. Brit. Museum.

Colombia: Boqueron, Chiriqui, 33 specimens; Boquete, Chiriqui, 5 specimens; coll. Amer. Mus. and J. H. Batty.

Total, 52 specimens.

The above description is based on a series of 14 specimens, of which 7 are from Eten, Peru, two from Puna Island, and three from neighboring coast localities in Ecuador. In size they greatly exceed the series of *caucæ* from Cali, Colombia, and have the incipient face markings better defined. The tail about equals the head and body in length, as in that form. The total length of the animal, however, is about one eighth greater in *etensis* than in *caucæ*, and the length of the skull is also much greater—110.5 mm. as against 102.5 in *caucæ*. In size it approaches *D. m. richmondi* from Nicaragua, which, however, is not only much larger than *etensis* but has a relatively much longer tail, in *etensis* the length of the tail being a little less than that of head and body, and in *richmondi* considerably more than the head and body length.

A large series from the Department of Chiriqui, State of Panama, Colombia, is similar in size and proportions, and is not apparently distinguishable. This series includes 33 specimens from Boqueron, and 5 from Boquete, of which measure-

ments are given below (p. 277). These specimens are provisionally referred to *etensis*.

***Didelphis marsupialis battyi* Thomas.**

Didelphis marsupialis battyi THOMAS, Novit. Zool. IX, 137, April, 1902.

Type locality, Coiba Island, Panama, Colombia.

Geographical Distribution. — Coiba Island.

"Closely allied to *D. m. caucae* Allen, and agreeing with it in most details; but the face uniformly dark, with distinct white spots, about $\frac{1}{2}$ in. in diameter, round the roots of the supraorbital and malar tufts of bristles. These white spots are clearly the remnants of the usual light frontal and cheek patches, the lower cheeks and lips being in the present animal no lighter than the rest of the head. No light dorsal bristles present in any of the specimens. Tail white for rather less than half its length, its basal fifth being like the body.

"Skull rather narrow, the muzzle long and the zygomata little expanded.

"Dimensions of the type, measured in the skin: Head and body 430 mm.; tail 390; white part of tail, 180; hind foot (wet), s.u. 57, c.u. 63; ear (wet), 50; skull, greatest length in middle line, 108; basal length, 100; greatest breadth, 52.5; combined length of three anterior upper molariform teeth, 18.4.

"*Type*: Old female. Original number, 106. Collected 6 May, 1901. Four specimens.

"The four specimens are all exactly similar in size and colour, and no doubt represent an insular form of the Colombian *D. m. caucae*."—THOMAS, *l. c.*

Compared with a large series of specimens from the mainland, *D. m. battyi* seems to represent a small insular race, as shown by several topotypes kindly presented by the collector, Mr. J. H. Batty, to this Museum. I am also indebted to Mr. Batty's kindness for a transcript from his note-book of the measurements of the specimens taken before skinning. I am thus able to supplement Mr. Thomas's description with the flesh measurements of not only his type, but also of 7 additional specimens, given in the subjoined table (see p. 278). The four females, rather strangely, happen to range rather larger than the four males, doubtless owing to the fact that the females had reached a greater maturity than the males. If the females of the Coiba Island series and the females of the Boqueron and Boquete series be taken

as the basis of comparison, the apparent difference in size practically vanishes.

***Didelphis marsupialis aurita* (Wied).**

Didelphys marsupialis WIED, Beitr. zu Naturg. Bras. II, 1826, 387 (not of Linnæus).

Didelphys aurita WIED, Beitr. zu Naturg. Bras. II, 1826, 393. "Villa Viçosa am Flusse Peruhype." Gray phase. — BURMEISTER, Thiere Bras. III, 1854, 130, gray phase; Erläut. zur Fauna Bras. 1856, 64, pl. iii, animal, pl. v, fig. 3 and pl. vi, fig. 1, skull (not the reference to *D. azarae* Temminck, etc.). — PELZELN, Verh. z.-b. Gesell. Wien, XXXIII, Anh. 1883, 109, part; southern Brazil. — GOELDI, P. Z. S. 1894, 457. Serra dos Orgãos, Brazil.

Didelphis marsupialis aurita COPE, Am. Nat. Feb. 1889, 129, 149. São João do Monte Negro, Rio Grande do Sul.

Didelphys azarae WAGNER, Schreber's Säug. Suppl. III, 1843, 38 (mainly); *ibid.* V, 1855, 223 (part).

Didelphys cancrivora BURMEISTER, Thiere Bras. III, 1854, 129 = *D. marsupialis* Wied, (non Linn). Dark phase. — HENSEL, Phys. Abhandl. Akad. Wiss. Berlin, 1872 (1873), 114, pl. i, figs. 2 and 5. Rio Grande do Sul. — PELZELN, Verh. z.-b. Gesell. Wien, XXXIII, Anh. 1883, 110 (Sapitiba). — WINGE, Jordfunde og nulevende Pungdyr (Marsupialia) fra Lagoa Santa, etc., E. Museo Lundii, II, 1892, 8, pl. i, figs. 9, 9b; pl. iii, fig. 4; pl. iv, fig. 10.

Didelphys koseritzi IHERING, Mamm. do Rio Grande do Sul, 1892, 99 (p. 6 of separates). Black phase.

Type locality. — Villa Viçosa, Rio Peruhype, southeastern Brazil. Based on a single specimen, in the gray phase.

Geographical Distribution. — Southeastern Brazil, from Bahia (?) south to Rio Grande do Sul, and westward to Matto Grosso, Paraguay, northern Argentina, and eastern Bolivia.

Adult. — Dichromatic, with a gray phase and a black phase. An average adult in gray phase (Brit. Mus. No. 1-2-7-61, ♀ ad., Cruzeiro, alt. 530 m., San Paulo, Brazil, A. Robert, Nov. 14, 1900) may be described as follows:

Above soiled white, strongly varied with black; long overhair white to base, 80-100 mm. long on lower back; underfur clear yellowish white to base on middle of back, dirty yellowish brown at extreme base on sides, apical third to half black, coarser, almost bristly; below pelage much shorter and more woolly, brownish white basally, and tipped with blackish brown, with a sprinkling of yellowish white hairs; woolly hairs at edge of pouch dark brown or blackish chestnut; an indistinct spot of clear white on middle of chest; lower throat

more buffy yellow; chin and upper throat similar, but with the hairs tipped with dark brown, giving a darker effect. Head pattern quite well-defined, the light areas buff (not white) and the dark areas blackish or blackish brown. The central head stripe begins on a line opposite the front border of the eyes, and gradually widens posteriorly to the nape; the loreal stripes begin about half-way between the nose and the eyes, and extend back, enclosing the eyes, nearly to the base of the ears, but less well defined and broader behind than in front of the eyes; sides of head below the ears buffy yellow. The head markings are generally indistinct in adults, well defined in young specimens and in exceptional adults. The light areas on each side of the median dark stripe form a distinctly lighter oval spot above and behind the posterior half of the eyes. Ears very large, *wholly black*. Fore and hind limbs black, including the toes, which (as usual in the genus) are semi-nude. Tail a little shorter than head and body, covered as usual at the extreme base by long hair like that of the adjoining part of the body, the rest naked, the basal half or more black, the remainder flesh-color.

This is the usual style, which varies on the dorsal surface to practically black, and to much darker below.¹ The light face markings are often nearly obsolete, being reduced to a dark buffy round spot over the eyes, with another on the posterior part of the cheeks. The under-fur is often strongly yellowish white on the back and bright buff below, the extreme base being ochraceous buff, as in nearly all of the members of the *marsupialis* group, due apparently to a sebaceous secretion.

Young. — The nursing young are similar to the adults in coloration, both in the gray and black phases, except that the head markings are more pronounced, and the ears are white or flesh-color, more or less blotched with dusky, chiefly towards the base. In very young specimens the ears are doubtless wholly white to the base, as in the other members of the genus. In a series of 15 specimens from Piqueté and Cruziero, São Paulo (coll. A. Robert), the 9 adults have wholly black ears and the 6 young have particolored ears, the apical half or more being flesh-colored and the basal portion dusky or mottled with dusky. There is also rather less black at the base of the naked portion of the tail in the young than in the adult. The toes are wholly black in all, although Burmeister has described the toes as pinkish or flesh-color.

In the young (less than one-sixth grown) of this species the head markings are almost as distinct as in the young of corresponding age of *D. paraguayensis*, but the dark and light areas are less sharply contrasted, the light areas being buffy white instead of clear white, and the dark areas brown-black instead of deep black.

¹ Hensel (*l. c.*) states that of 40 individuals of which he had noted the color, 15 were black and 25 were white.

Measurements. — As shown in the subjoined table (p. 278), 3 adult males from São Paulo measure: Total length, 778 mm. (745–806); head and body, 417 (405–426); tail, 349 (340–380); hind foot, 58 (48–61); ear, 48 (46–50). Six adult females average somewhat less. *Skull:* Total length, 7 males, 106 (96–109); basal length, 95.3 (94–100); nasals, 50.4 (47–54.5); zygomatic breadth, 55.5 (52.5–60); postorbital breadth, 23.4 (20–26.5); postorbital constriction, 11 (10–12); occipital breadth, 31 (30–32); breadth at canines, 19.7 (17.5–20.5); upper tooththrow, 33 (31–36); molar series, 19 (18–20).

Specimens examined:

Brazil: Rio Rodeio, Serra do Mar, near Rio de Janeiro, 1 specimen; Rio de Janeiro, 1 specimen; Cruziero, São Paulo, 8 specimens; Piqueté, São Paulo, 7 specimens; Taquara, Rio Grande do Sul, 4 specimens, including paratypes of *D. koseritzi* Ihering; Rio Grande do Sul, 6 specimens.

Total, 27 specimens, coll. British Museum.

D. m. aurita of southern Brazil is smaller than true *marsupialis* of northern Brazil, much darker in coloration, and with much better-defined head markings. It more resembles the dark forms of northern and northwestern South America, but has the head markings more distinct and is very much smaller. In exceptionally strongly marked specimens the head markings sometimes approach in distinctness those of *D. paraguayensis*, but in such cases the light markings are deep buffy instead of clear white, and the dark areas are more brownish black and not nearly so sharply defined. Authors, however, have sometimes failed to distinguish these two very distinct forms, which seem to occur together over quite a large area.

Didelphis paraguayensis Oken.

Carigueya brasiliensibus, MARCGRAVE, Bras. 1648, 222 (*apud* Lund, l.c.).

Tai-ibi brasiliensibus, MARCGRAVE, Bras. 1648, 223.

Micouré premier, ou Micouré proprement dit, AZARA, Quad. Parag. I, 1801, 244.

Did[elphys] paraguayensis OKEN, Lehrb. der Naturg. Theil III, Abt. ii, 1816, 1147. Based primarily on Azara (*cf. antea*, p. 251).

Didelphis azaræ TEMMINCK, Mon. Mamm., 2^o Mon. 1825, 30.—RENGGER, Naturg. Thiere Parag. 1830, 223. Grand Chaco and Provinces of Entre-Rios and Banda Oriental. — MARTIN, P. Z. S. 1834, 101, anatomy. — THOMAS, Ann. and Mag. Nat. Hist. (7) VIII, Dec. 1901, 536. Rio Jordão, southwestern Minas Geraes.

Didelphys azaræ WATERHOUSE, Nat. Hist. Mamm. I, 1846, 470 (except ref. to *D. aurita* Wied). Brazil, Paraguay, Bolivia, etc. — BURMEISTER, Erläut. Faun. Bras. 1856, 61, pl. i, animal. — WAGNER, Schreber's Säug. Suppl. III, 1843, 38 (part); *ibid.* V, 1855, 223 (part). — HENSEL, Phys. Abhandl. Akad. Wiss. Berlin, 1872 (1873), III, pl. i, figs. 1 and 4. Rio Grande do Sul. — THOMAS, Ann. Mus. Civ. Stor. Nat. Genova, XX, 1900, — (p. 4 of separates). Province of Parana, Brazil.

Didelphys marsupialis azaræ COPE, Am. Nat. Feb. 1889, 129, 149. São João do Monte Negro, Rio Grande do Sul, and Chapada, Matto Grosso, Brazil.

Didelphys albiventris LUND, Kongl. Dansk. Vidensk. Selsk. Afhandl. VIII, 1841, 236. Lagoa Santa, Brazil. — BURMEISTER, Erläut. Faun. Bras. 1856, pl. ii, animal; pl. v, figs 4 and 5, and pl. vi, fig. 4, skull.

Didelphys pæcilotis WAGNER (ex Natterer, MS.) Arch. f. Naturg. 1842, i, 258, Cuyaba, Matto Grosso, Brazil; Abhandl. Akad. Wiss. München, V, 1847 (1850), 126; Schreber's Säug. Suppl. V, 1855, 219 (identified with *D. albiventris* Lund, of earlier date). — PELZELN, Verh. z.-b. Gesell. Wien, XXXIII, Anh. 1883, 109.

Didelphys leucotis WAGNER, Abhandl. Akad. Wiss. München, V, 1847 (1850), 127 (in text); Schreber's Säug. Suppl. V, 1855, 223 (Azara's Micouré premier renamed).

Didelphys pæcilonota SCHINZ, Syn. Mamm. I, 1844, 504. Rio Grande do Sul, Brazil.

Didelphys lechii IHERING, Mamm. do Rio Grande do Sul, 1892, 95 (p. 5 of separates) Dark phase, from south of the Rio Grande do Sul.

Didelphys marsupialis var. *albiventris* WINGE, Jordf. og nulev. Pungdyr (Marsupialia) fra Lagoa Santa, etc., E. Mus. Lundii, II, 7, pl. iii, fig. 3; pl. iv, fig. 9. Lagoa Santa.

Type locality, Asuncion, Paraguay.

Geographical Distribution. — Uruguay, northern Argentina, eastern Bolivia, and northward to central Matto Grosso, and Minas Geraes, Brazil.

Adult. — Above varied black and white, through the presence of a more or less abundant coat of long overhair, which is wholly clear white to the base in fresh pelage, soiled dingy white in old pelage; underfur clear white or yellowish white, the apical third deep black, the black-tipped portion very long and much coarser than the basal white portion, the pelage of the ventral surface having the character of woolly underfur tipped with black hairs, especially over the median area. The amount of white overhair above varies from being abundant, and forming a conspicuous feature of the pelage, to a scanty sprinkling or, in the black phase, its entire absence. Below the general color varies from nearly pure white to deep buff, with or

without black tips to the longer hairs. Face markings white and black, strongly contrasted and sharply defined; the V-shaped median black stripe begins about opposite the anterior corner of the eyes and runs back to the occiput, merging on the nape with the black-tipped underfur of the dorsal region. The lateral face marks begin at base of whiskers, midway between nose and eye, running back to enclose the eye, but terminating just behind it as a well-defined spot; sides of the head behind the eye-streak more or less suffused with dusky, forming an ill-defined band for about half the distance from eye to ear, produced by the tips of the hairs being tinged with blackish; a broad white band behind this dusky extension of the eye-streak joins the white of the cheeks with the broad supraloral white band. Ears apically white, the basal third more or less dusky but not black. Fore and hind limbs and basal half (or more) of tail black; the apical portion of tail white or very light flesh-color.

Young. — Similar to the adult, except that the eye-stripe runs posteriorly to the base of the ear, where it becomes somewhat expanded vertically.

Measurements. — An adult male, Goya, Argentina (R. Perrens): Total length, 673 mm.; head and body, 378; tail, 295; hind foot, 41; ear, 55. An adult female, Chaco, near Asuncion, Argentina (Messrs. Swan): Total length, 653; head and body, 378; tail, 311; hind foot, 43; ear, 52. *Skull:* Old female, total length, 85; basal length, 77; zygomatic breadth, 43.5; length of nasals, 38; postorbital processes, 15.5; postorbital constriction, 9.6; occipital breadth, 26; breadth at canines, 15; upper toothrow, 29; molar series, 16. Another old female skull and an adult male skull, same locality, both more or less imperfect, present practically the same measurements.

An adult female from southern Minas Geraes (Rio Jordão, A. Robert) gives the following external measurements: Total length, 650; head and body, 360; tail, 290; hind foot, 40; ear, 53.

Specimens examined:

Argentina: Chaco, near Asuncion, 5; Tucuman, 1; Goya, 10, mostly half grown or younger.

Brazil: Lagoa Santa 1 (topotype of *D. albiventris* Lund); Rio Grande do Sul, 3 (including topotypes of *D. lechii* Ihering); Rio Jordão, southwestern Minas Geraes, 3.

Total, 23; coll. British Museum.

So far as the material at present available indicates, the south Brazilian animal may well be referred to true *paraguayensis*. Lund's *D. albiventris* was based on the light phase with a white belly, with which Wagner has himself identified his later-described *D. pæcilotis*. Wagner's *D. leucotis* is a new name for *D. azaræ* Rengger, which is the true *paraguayensis*.

Ihering's *D. lechii* was based on dark specimens from São Paulo.

The Chaco specimens are practically topotypes of Azara's Micouré premier, Azara's headquarters when he wrote his 'Quadrupeds du Paraguay' having been Asuncion, from which the Chaco localities are only about 50 to 70 miles distant. Goya is about 200 miles to the southward. The Chaco specimens are either wholly black, or have only a few scattered white hairs, while none of the Goya series is black.

Respecting the relative proportion of specimens of the two color phases, light and dark, it is of interest to note that Hensel (*l. c.*) states that of 57 specimens (the sexes equally represented), of which he noted the color, 11 were black, 45 white, and 1 intermediate; and that in a litter of 9 young found in the pouch of a white female, one was black, two had a few white hairs, and the rest were of the white phase. This affords conclusive evidence, if any were needed, that the dimorphism has no relation to sex or age.

There is little doubt that Temminck's name, *azarae*, properly relates to this animal, which he identified with Azara's Micouré premier.¹ His description is pertinent to this in every respect except one, and not at all to the black-eared opossums of the *marsupialis* group. Throughout his description he reverses the color of the ears, as though writing from memory rather than with the specimens before him; describing them as yellowish at the base and all the rest black ("le plus souvent jaunâtres à la base seulement, et noires sur tout le reste"). Owing to this error Wagner (Abhandl. Akad. Wiss. München, V, 1847 [1850], 127) re-named Azara's Micouré premier *D. leucotis*, and applied the name *azarae* to the black-eared species of southern Brazil, which Wied had named *D. aurita*. While it may be held that Temminck's name is clearly identified by his description as being applicable, as he intended it to be, to the animal described by Azara under the name Micouré premier, it is perhaps not an unmixed evil that an earlier name for the

¹ Cf. Thomas, Cat. Marsup. and Monotr., 1888, p. 328, footnote.

species is found in the *Didelphis paraguayensis* of Oken. (Cf. *antea*, p. 251.)

***Didelphis paraguayensis pernigra* (Allen).**

Didelphis azarae TSCHUDI, Fauna Peruana, I, 1844-1846, 143, 151 (part; not the description and only part of the references).

Didelphis pernigra ALLEN, Bull. Am. Mus. Nat. Hist. XIII, 1901, Oct. 23, 1900; Inca Mines, Peru; *ibid.* 219; *ibid.* XIV, 1901, 41, 176, 186 (measurements). — THOMAS, Ann. and Mag. Nat. Hist. (7) VII, Feb. 1901, 190 (southeastern Peru).

Type locality, Inca Mines, Department of Puno, on the upper Inambari River, southwestern Peru.

Geographical Distribution. — Central and southern Peru, into Bolivia. At the northward represented by a larger form, the *D. p. andina*.

Entire upper parts, except the head, intense shining black, the long thick overhair being wholly black, abundant, and not very stiff; basal half of the soft woolly underfur pale yellowish white, the tips black, the white basal portion wholly concealed by the thick, heavy coat of black overhair; head white, with three prominent, sharply defined black bands, one median and two lateral; the median stripe begins in a narrow point and rapidly expands posteriorly to the nape, where it merges with the black of the dorsal surface; the lateral stripe extends from the base of the whiskers to a little behind the eyes and then continues as an ill-defined dusky patch nearly to the ears; cheeks and throat rusty buff; rest of lower surface, except around the abdominal pouch, buffy white, the tips of the longer hairs black, giving a dusky tinge to the ventral surface; ears thickly haired for their basal half, *entirely white*, in striking contrast with the intense black of the whole upper surface of the body; feet black, the toes seminude; tail black for the basal two thirds of the naked portion, the rest white.

The young are similar in coloration to the adults.

Measurements. — Seven adults from Inca Mines, Peru, the type locality, seem to indicate very little sexual difference in size; the females average rather larger than the males, which may be due to their being obviously older, as shown by the skulls; yet the same is true of 9 other specimens from other localities as shown in the subjoined tables of measurements (see p. 279). *Skull:* For measurements of the skulls of the specimens from Inca Mines, see this Bulletin, XIV, 1901, p. 186. A series of 6 skulls from other localities agree in proportions, but range rather larger, the total length running from 91 to 102 mm., with the other measurements in proportion.

Specimens examined:

Peru: Inca Mines, altitude about 5000 feet, Depart. of Puno, 8 specimens, mostly 'young adults' (coll. Am. Mus.); Callao, altitude 60

feet, 4 specimens; Huacapistona and Perene, Depart. of Junin, altitude, 6000-7000 feet, 3 specimens; Limbona, Depart. of Puno, altitude 6700 feet, 1 specimen; Surco and San Mateo, Depart. of Lima, altitude 7000 to 9000 feet, 2 specimens; Carao, Depart. of Cajamarca, altitude 6000 to 7000 feet, 2 specimens (coll. Brit. Mus.).

Bolivia: Depart. of La Paz, altitude 4000-9000 feet, 3 specimens (coll. Brit. Mus.).

Total, 23 specimens, nearly all from altitudes above 5000 feet. All are in the wholly black phase except one.

D. paraguayensis pernigra differs from true *paraguayensis* in the greater extent of the black face markings, the median stripes beginning further forward, and the eye-stripes being broader and extending forward almost to the naked muzzle. The ears are, in the typical phase, entirely flesh-color; a few specimens from other localities, here referred to this form, show a tendency to dusky mottling at the base. The general size of the animal is rather larger, and the tail relatively longer than in *paraguayensis*, while the ears are smaller and much more hairy.

This appears to be the only form of *Didelphis* inhabiting central and southern Peru. Tschudi also mentions only one species of true *Didelphis* as occurring in Peru, which he says is found in all parts, but especially in western Peru. He speaks of it as reaching an altitude of 12,500 feet, but as being absent from the hot forest region, and rare on the eastern slope of the Coast Range at 6000 feet. His description of the species, however, is obviously compiled from Temminck and not based on Peruvian specimens, he even copying Temminck's erroneous description of the ears — "schwartz-braun, an der Basis smutzig weiss."

Didelphis paraguayensis andina, subsp. nov.

Didelphis azarae TOMES, P. Z. S. 1860, 268. Cuenca, Ecuador.

Type, No. 99-12-7-6, British Museum, ♂ ad. Loja, Ecuador, June 2, 1899; coll. P. O. Simons; original number 352.

Geographical Distribution. — Andes of Ecuador, from 6000 feet to 12,000 feet altitude, and probably southward into northern Peru.

Gray phase. — Above varied black and white; long bristly over-hair abundant, pure white; underfur white, very broadly tipped with intense black, involving about the apical third of the longer fibres;

below yellowish white, washed with grayish brown, due to the brown tipping of the longer hairs; limbs and feet wholly black, the former with a few scattered white hairs; head white with the dark markings very broad; the median stripe begins somewhat in front of the eyes and extends as a narrow band to the nape; the lateral stripe begins a little behind the eye, extends forward to the nose, and abruptly widens on the upper side, opposite the middle of the eye, so as to occupy nearly the whole of the side of the nose in front of the eye, where the two lateral stripes nearly meet, being separated by a light median space only about half as wide as the dark eye-stripe; the lower edge of the black eye-stripe forms a straight line running a few millimeters below the eye; immediately surrounding the eye and in front of it the dark stripe is intense black, but more anteriorly passes into brown-black, and immediately behind the eye quite disappears, leaving the space between the eye and ear dusky grayish white, through a slight dusky tipping to the hairs. The light area on the head begins on the nose as a narrow whitish band, dividing some distance in front of the eyes and passing, as a V-shaped mark on either side of the pointed median black band, back to the ears, spreading out laterally behind the eyes till it joins the white cheek-band, with, as already said, the tips of the hairs between the eyes and ears slightly obscured with dusky. The usual broad white cheek-band occupies the whole area below the eyes, from the nose to the side of the neck, which is superficially obscured with dusky, and often suffused basally with yellowish brown or gamboge. Ears hairy at the base, usually wholly light or flesh-color, but of a deeper, browner (not dusky) tint basally than apically; some specimens show dusky blotches basally. Tail black basally for about one third to one half the length of the naked portion, the rest light or flesh-color, but the relative extent of light and dark portions very variable.

Black phase. — Wholly without the long white overhairs, but otherwise similar to the gray phase. In the black phase the ears seem to show less tendency to dusky blotching at the base than in the gray phase.

The color of the ventral surface varies greatly in different individuals, in both phases. In some specimens the chin, throat, and breast are dull grayish or buffy white, while the rest of the ventral surface is superficially black, the whitish underfur showing only on parting the pelage. In other specimens the whole ventral surface is whitish, just as in the so-called *albiventris* phase of true *paraguayensis*.

Young. — Four very young specimens, in first pelage, from Cuenca, Ecuador, are dull black above profusely lined with white, the future white overhair; below thinly clothed with short hairs of a dull soiled white. Eye-stripe merely an oval ring enclosing the eye, its future extension, both anteriorly and posteriorly, outlined by a dusky tinge. Ears wholly flesh-color, very hairy on both surfaces.

[August, 1902.]

Measurements. — The fine series of adults with measurements taken in the flesh by the late Mr. P. O. Simons include 7 specimens of each sex, which indicate the usual sexual difference in size found in the members of the genus *Didelphis*, and which doubtless obtains in all. (See subjoined tables of external measurements, p. 279.) The skulls belonging to these skins show that nearly all were middle-aged adults. The male skulls range in total length from 92 to 104 mm., and the females from 87 to 97, and thus considerably exceed in size specimens of corresponding age of the more southern *D. p. pernigra*.

Specimens examined:

Ecuador: Cañar, altitude 9000 feet, 3 specimens; Cayambe, altitude about 9000 feet, 1 specimen; Cuenca, altitude about 7500 feet, 4 specimens; Ibarra, altitude about 7500 feet, 2 specimens; Loja, altitude about 7000 feet, 2 specimens; Quito, altitude about 9500 feet, 5 specimens; Riobamba, altitude about 9000 to 12,000 feet, 5 specimens.

Total, 22 specimens, coll. British Museum.

This form differs from *pernigra* in being much larger, and in having the dark lateral head stripes much broader, especially in front of the eyes.

Didelphis paraguayensis meridensis, subsp. nov.

Type, No. 98-7-1-14, British Museum, ♂ juv., Merida, Venezuela, altitude about 6500 feet.

Geographical Distribution. — Eastern Cordillera of Colombia and Venezuela. The only localities represented are Bogota and Merida.

Black phase. — Long overhair black for apical two thirds, basal half white; underfur pale yellowish white, broadly tipped with black; below pale yellowish white, the tips of the hairs pale grayish brown; median face stripe much shorter and narrower than in *pernigra* and *andina*; eye-stripes greatly reduced, narrow, and extending but little beyond the eye either in front or posteriorly, forming a small oval eye-spot, about three times longer than wide. Ears wholly pale yellow; limbs and feet black; tail black for the basal third, the rest pale yellow.

Gray phase (No. 42-4-12-20, Brit. Mus., Sta. Fé do Bogota, Colombia, ♂ juv.). — Similar in face markings and general coloration to the black phase, except that the bristly overhair is white instead of black.

This subspecies is based on the two specimens above described, neither of which is full-grown, nor are the skulls available for examination. It is strikingly different from the two Andean forms through the great reduction in extent of

the black face markings, which are even more restricted than in true *paraguayensis*. Although the material for examination is so scanty, it suffices to indicate a very distinct form, the geographical range of which appears to include the Eastern Cordillera region of Colombia and Venezuela. It is evidently cut off in its distribution from true *paraguayensis* of southern Brazil by the great Amazonian basin, where no form of this group appears to have been reported. Probably in southern Colombia its range connects with that of *D. p. andina*. In the character and extent of the head markings it, however, much more resembles the Argentina and south Brazilian type than it does either of the Andean forms.

Tables of the external measurements of the above described forms of *Didelphis* follow (pp. 276-279).

EXTERNAL MEASUREMENTS OF SPECIES AND SUBSPECIES OF DIDELPHIS.

	Mus. No.	Locality.	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Ear.
<i>Didelphis marsupialis marsupialis</i> , ¹	1-6-4-125	Kanuka Mts., Br. Guiana,	♂	762	381	381	57	57
"	1-6-4-126	"	♂	775	381	384	57	57
"	1-6-4-127	"	♂	712	330	382	51	51
"	99-9-11-30	Mapures, Venezuela,	♀	776	357	419	54	52
	Average, 4 specimens.....			756	362	394	55.4	54
<i>Didelphis marsupialis insularis</i> , ²	6061	Princetown, Trinidad, March 27, 1893	♂	810	385	425	55	—
"	6063	Caura, " 6, 1894	♂	920	455	465	66	—
"	7734	Caperó, " 6, 1894	♂	955	500	455	64	55
"	7740*	Princetown, " March 26,	♂	910	470	440	57	65
"	6062	" 9, 1893	♂	740	350	390	55	—
"	7732	Caperó, " 22, 1894	♂	830	400	430	57	52
"	7733	Caura, " April 9,	♀	850	468	382	58	53
	Average, 4 ♂♂.....			874	452	446	60.5	60
	" 3 ♀♀.....			807	406	401	57	52.5
<i>Didelphis marsupialis colombica</i> , ²	14613	Bonda, Santa Marta, Colombia, Jan. 19, 1899	♂	710	355	355	57	—
"	15456	" " " Aug. 5,	♂	980	497	483	68	—
"	15453*	" " " April 19,	♂	824	371	453	57	—
"	14615	" " " Jan. 14,	♂	786	456	330	57	—
"	14614	" " " Dec. 20, 1898	♂	863	406	457	54	—
"	15452	" " " April 5, 1899	♂	812	406	406	57	—
"	15455	" " " July 24,	♀	673	318	355	57	—
	Average, 4 ♂♂.....			825	420	405	60	—
	" 3 ♀♀.....			783	377	406	56	—

* Type.

¹ Specimens in British Museum.
² " " American

EXTERNAL MEASUREMENTS, ETC.—*Continued.*

	Mus. No.	Locality.	Date ¹	Sex.	Total length.	Head and body.	Tail.	Hind foot.	Ear.
<i>Didelphis marsupialis batleyi</i> , ¹									
"	104	Coiba Island, Colombia,	April 15, 1901	♂	715	355	360	55	50
"	105	"	May 14, "	♂	845	430	415	60	50
"	107	"	" 17, "	♂	808	405	403	60	43
"	110	"	" 18, "	♂	815	425	390	53	50
"	103	"	April 11, "	♂	835	430	405	60	55
"	106*	"	May 14, "	♂	838	445	393	65	45
"	108	"	" 11, "	♂	820	425	395	60	55
"	109	"	" 18, "	♂	825	405	420	60	50
		Average, 4 ♂♂ 4 ♀♀			796 829.5	404 426	392 403	57 61	48.2 51
<i>Didelphis marsupialis aurita</i> , ²									
"	1-2-7-55	Piqueté, São Paulo, Brazil,	Nov. 16, 1900	♂	806	426	380	61	50
"	1-2-7-57	"	Dec. 4, "	♂	745	405	340	54	46
"	1-2-7-56	"	Nov. 30, "	♂	782	420	362	48	48
"	1-6-6-89	Cruzeiro,	Feb. 7, 1901	♂ juv.	600	310	290	46	49
"	1-6-6-91	"	Jan. 27, "	♂	770	410	360	55	52
"	1-6-6-90	"	" 23, "	♂	—	410	—	61	51
"	1-2-7-60	Piqueté	Nov. 13, 1900	♂	770	410	360	58	60
"	1-2-7-62	"	Dec. 8, "	♂	750	410	340	53	52
"	1-2-7-61	"	Nov. 14, "	♂	678	358	320	41	39
"	92-5-9-1	Rio Rodeiro, Serra do Mar, Brazil,	Sept. 8, 1897	♀	753	365	388	55	55
		Average, 3 ♂♂ ad. 6 ♀♀ ad.			778 744	417 410	394 354	54.7 54	48 51.5

¹ Original No., coll. J. H. Batt.² Specimens in British Museum.

* Type.

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	" 4.75	" " II, 1899 " 2.00	
" III, 1890-91.....	" 4.00	" " III, 1900 " 2.00	
" IV, 1892.....	" 4.00	" " IV, 1901 " 1.75	
" V, 1893.....	" 4.00	" " (Complete). " 5.00	
" VI, 1894.....	" 4.00	" XII, 1899..... " 4.00	
" VII, 1895.....	" 4.00	" XIII, 1900..... " 4.00	
" VIII, 1896.....	" 4.00	" XIV, 1900..... " 4.00	
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " 3.00	
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

- PART I.**—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.**—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.**—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.**—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.
- PART V.**—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.**—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.**—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

- PART I.**—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.**—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.**—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.**—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.**—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.**—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A further note on the name of the Argentine Viscacha.

As has been fully shown,* there is no doubt of the pertinence of the generic name *Viscaccia* Schinz, 1825, to "la Vizcache," of Azara, the Argentine Viscacha. But it turns out that Oken (Lehrb. d. Naturg., Theil III, Abth. 2, p. 835, 1816) used the same term in 1816, in nearly the same sense. Oken included in his group or subgenus *Viscaccia* only two species: (1) *Lepus chilensis* and (2) *Mus laniger*. The first, notwithstanding the name *chilensis*, is based, as far as the description is concerned, wholly on "la Vizcache" of Azara, while in his diagnosis of the group *Viscaccia* he says "Zehen vorn 4, hinten 3," which would exclude his second species, the *Mus laniger* of Molina, and hence the Chinchilla of Peru. As Bennett in 1829, made the Chinchilla the type of his genus *Chinchilla*, the Argentine Viscacha also becomes by restriction the type and only species of Oken's *Viscaccia*, the authority for which name is thus Oken (1816) instead of Schinz (1825).

It also unfortunately happens that Oken's name *chilensis* has one year's priority over *maximus* of Desmarest† (*Dipus maximus* Desm. ex Blainville M. S.). Hence, apparently, the Argentine Viscacha must be called *Viscaccia chilensis* (Oken). From his account of the animal, he appears to have believed, as did Azara, that it was found in Peru, and also in Chili, as shown by his reference to the use made of its fur in those countries. He gives its distribution correctly, however, as follows: "In Paraguay ist es nur westlich des Flusses Uruguay, vom 30° B. gegen Süden, südlich von Buenos Ayres sehr gemein."

Oken was almost erratic and irregular in nomenclatorial matters, viewed from the standpoint of present day usages, as was Zimmermann in his "Specimen Zoologiæ Geographicæ" 1777. His use of the generic names *Lepus* and *Mus* for the species he placed under *Viscaccia* will not surprise systematists who are familiar with the character of Oken's "Lehrbuch," although the name *Lepus chilensis* is apparently Oken's own name. It appears to have heretofore escaped citation.—J. A. Allen.

*Cf. Palmer, Science, N. S., VI, p. 21, July 2, 1897; Thomas, Proc. Biol. Soc. Wash., XIV, p. 25, April 2, 1901; Allen, ibid., p. 181, Dec. 2, 1901.

†Nouv. Dict. d'Hist. Nat., XIII, p. 117, 1817.

*Mammal Names Proposed by Oken in his
'Lehrbuch der Zoologie.'*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XVI, ARTICLE XXVII, pp. 373-379.

New York, Oct. 11, 1902.

The Knickerbocker Press, New York

Article XXVII. — MAMMAL NAMES PROPOSED BY
OKEN IN HIS 'LEHRBUCH DER ZOOLOGIE.'

By J. A. ALLEN.

The second part of Oken's 'Lehrbuch der Zoologie,' published in 1816,¹ includes the Vertebrates, pp. 651-1284 being devoted to mammals. While Oken's 'Lehrbuch' has been rarely cited, account has been taken of some of the names first proposed in it, and when found to have priority they have been adopted; a few others quite as well entitled to recognition appear to have been overlooked. Such of the latter as relate to mammals are here considered.

Oken was almost as erratic and irregular in nomenclatorial matters as was Zimmermann in his 'Specimen Zoologiæ Geographicae,' published in 1777,² but in some respects is less satisfactory, since he failed to cite authorities for the names used, and gave no references to his sources of information. Both diagnosed generic, subgeneric and other groups, as well as species, under either vernacular or systematic names, as seemed to please their fancy, and employed the names given by previous authors as these authors used them, regardless of whether the generic portion of the name conformed or not to the genus to which they assigned the species. Yet they each had a 'system,' — sadly defective, however, when tried by the nomenclatorial usages of to-day. But it is usually not difficult to determine what they meant to indicate.

In the case of Oken, many of the names which he gave were merely substitutes for earlier names. In the case of groups or species not previously named, upon which he bestowed names (fortunately few), their basis is clearly evident. He gave new names to all his higher groups, from classes down to his

¹ [Lorenz] Oken's | Lehrbuch | der | Zoologie. | — | Mit vierzig Kupfertafeln. | — | Zweite Abtheilung | Fleischthiere. | — | (Preis: 2 Thaler.) | — | Jena, bei August Schmid und Comp. | 1816.

Or:

Oken's | Lehrbuch | der | Naturgeschichte. | — | Dritter Theil | Zoologie. | Mit vierzig Kupfertafeln. | — | Zweite Abtheilung | Fleischthiere. | . . . [Rest of title page as above.] — 8 vo., 3 ll. (= 2 title pages and dedication), and pp. i-xvi., + 1-1270, 1 l. and chart of classification.

² See *antea*, pp. 13-22.

'Gattungen,' and to a large number of these, but as they are all vernacular and not technical they do not require consideration as an element in nomenclature. His 'Gattungen' are for the most part supergeneric groups, and in many cases conform to modern families rather than to genera. But he subdivided his 'Gattungen' into groups, or sections, that correspond nearly with the modern idea of genera. For these he adopted the names already given to them by previous authors or, with few exceptions, supplied new ones of his own, but left some under merely vernacular names or without names. As an exposition of this phase of the subject I subjoin his classification of the order of Rodents, in the sequence employed in the 'Lehrbuch.' This is not, however, the order in which the groups are given in his 'Nahmen zu Okens Zoologie', II, pp. i-xi; (Mammals, pp. ix-xi, Rodents, pp. ix, x); neither are the names and groups always equivalent in the list of names and in the text.

The text was evidently put together carelessly, as in several instances species of the same group are widely separated (see *Arctomys*, pp. 837-and 856), and there is apparently here and there some duplication.

II. ORDNUNG. *Lurchsucke*—*Pfoter*.

1. Sippschaft. *Froschpfoter*—*Näger*.

1. Gattung. *Hasen*.

- | | |
|----------------------------------|---------------------|
| 1. <i>Savia</i> , <i>Cavia</i> . | 2. <i>Lepus</i> . |
| a. <i>Hydrochaerus</i> . | a. <i>Lagomys</i> . |
| b. <i>Coelogenys</i> . | b. <i>Lepus</i> . |
| c. <i>Dasyprocta</i> . | |
| d. <i>Cavia</i> . | |

2. Gattung. *Bilche*.

- | | |
|------------------------|---------------------------|
| 1. <i>Jaculus</i> . | c. <i>Aspalax</i> . |
| a. <i>Dipus</i> . | d. <i>Mus bursarius</i> . |
| b. <i>Pedetes</i> . | c. <i>Tamias</i> . |
| 2. <i>Murzer</i> . | 4. <i>Schwirrel</i> . |
| a. <i>Viscaccia</i> . | a. <i>Sciurus</i> . |
| b. <i>Arctomys</i> . | b. <i>Pteromys</i> . |
| c. <i>Bathyergus</i> . | c. <i>Glis</i> . |
| d. <i>Georychus</i> . | 5. <i>Pile</i> . |
| 3. <i>Krietsche</i> . | a. <i>Loncheres</i> . |
| a. <i>Citellus</i> . | b. <i>Mus spinosus</i> . |
| b. <i>Cricetus</i> . | c. <i>Coendu</i> . |

3. Gattung. Traner.

- | | |
|-------------|--------------|
| 1. Hystrix. | b. Hydromys. |
| 2. Biber. | c. Guillino. |
| a. Castor. | 3. Ondatra. |

4. Gattung. Mäuse.

- | | |
|------------------|-------------------------|
| 1. Mus. | 2. Zeiste. [=Hypudæus.] |
| a. Meriones. | a. Zeiste; klein, etc. |
| b. Mus. | b. Mus gregarius. |
| a. Kleine Mäuse. | c. Glareolus. |
| b. Ratten. | b. Lemminge. |
| | b. Stossmäuse. [=Myos- |
| | palax.] |

I. GENERIC NAMES.

The following generic names are open to comment, and are noticed in the order of their occurrence in the 'Lehrbuch,' only those being mentioned which are not synonyms of earlier names, or which preoccupy later names.

Oryx (p. 672). = *Monodon* Linn., but of even date with *Oryx* Blainville for a genus of Antelopes. As Blainville's name has long been in current use and was published very early in the year 1816, there is no reason to question its tenability. It probably has a slight priority over *Oryx* Oken.

Viscaccia (p. 835). By restriction *Viscaccia* Oken equals *Viscaccia* Schinz, 1825. The authority is simply carried back to Oken. (See further on this case Allen, Proc. Biol. Soc. Wash., XV, 1902, p. —).

Citellus (p. 842). Type *Mus citellus* Linn., 1766. = *Spermophile* F. Cuvier, same type. (" . . . je donnerai au groupe dont le Souslik devient le type, le nom de *Spermophile*." F. Cuvier, Mém. du Mus. d'Hist. Nat., IX, 1822, p. 304). Or: *Spermophiles* F. Cuvier, in Dents des Mamm., 1825, p. 160, where he again says: "Ce genre est formé du souslik."

Also = *Citillus* Lichtenstein, 1830, primarily, and also by restriction. Lichtenstein separated the "europäischen Ziesel (dem polnischen *Suslik*)" as the type of a group which he took out of Cuvier's genus *Spermophilus*, leaving the other species

to be distributed in either *Arctomys* or *Spermophilus*. As the name chosen for the new group is the Linnæan specific name of the suoslik (changed in spelling from *citellus* to *citillus*), this species should be construed as the type of the genus *Citillus*, although he included under it three other species there described as new, only one of which, *C. mugosaricus*, is strictly congeneric with *C. citellus*.

As Oken's *Citellus* was based primarily on the *Mus citellus* of Linnæus and Pallas (*Arctomys citillus* Schreb.), as indicated not only by the name but by the forms placed under it, it has the same type as *Spermophilus* F. Cuvier, over which it has six years' priority (even accepting the name in its original vernacular form). As *Spermophilus* originally included only the souslik, it is a strict synonym of *Citellus* Oken. The fact that other authors later referred to it other species, as Lesson in 1827 (*Man. de Mamm.*, pp. 243-245), who appears to have been the first author who employed the Latin form of the name, this does not render the name of the originally monotypic *Spermophilus* available for any of the forms later referred to it.

In this connection it becomes of interest to see what provision has been made for the numerous species long currently associated with the name *Spermophilus*. The named sections of the group are the following, to which it may be necessary to add others for a few well-marked types apparently as yet unprovided for. Such deficiencies should only be supplied, however, on the basis of a careful revision of the entire group. The names that have been proposed in a generic or subgeneric sense, for the existing forms, in the order of date are:

1. *Citellus* Oken, 1816, type *Mus citellus* Linn. = *Spermophilus* F. Cuvier, 1822; = *Citillus* Lichtenstein, 1830.
2. *Anisonyx* Rafinesque, 1817, type *Arctomys columbianus* Ord, preoccupied by *Anisonyx* Latreille, 1809, for a genus of Coleoptera.
3. *Otospermophilus* Brandt, 1844, type *Arctomys grammurus* Say.
4. *Collobotis* Brandt, 1844, type, *Arctomys fulvus* Lichtenstein.
5. *Otocolobus* Brandt, 1844, an alternative name for *Collobotis*.
6. *Ictidomys* Allen, 1877, type, *Sciurus tridecemlineatus* Mitchell.
7. *Spermophilopsis* Blasius, 1884, type, *Citillus leptodactylus* Lichtenstein.

8. *Xerospermophilus* Merriam, 1892, type, *Spermophilus mohavensis* Merriam.
9. *Ammospermophilus* Merriam, 1892, type *Spermophilus leucurus* Merriam.
10. *Callospermophilus* Merriam, 1897, type, *Sciurus lateralis* Say.

Grison (p. 1000). Type and only species, *Viverra vittata* Schreber = *Galictis* Bell, 1826, same type. Synonyms: *Eirara* Lund, 1839 (in part); *Grisonia* Gray, 1843. The name *Grison* follows, instead of precedes, as is usually the order, the name of the species, but *Grison* stands as a technical name on p. xi.

Tayra (p. 1001). Based, as the name indicates, primarily on the 'Tayra,' or *Mustela barbara* Linn., but includes also the Pekan (*Mustela canadensis* Oken = *M. pennanti* Erxl.) = *Eira* H. Smith, 1842. Synonym: *Galera* Gray, 1843.

Thos (p. 1037). Proposed for, and includes only, the Jackals, the first species being *Thos C[anis] ceylonensis* Oken (= *Canis aureus* Linn., part). Synonyms: *Lupulus* Blainville, 1830; *Sacalius* H. Smith, 1839, which has the same type; *Oxygōus* Hodgson, 1841, same type; *Dieba* Gray, 1869, type, *Canis anthus* F. Cuvier.

The species referred by Oken to *Thos* are: (1) *Thos C. ceylonensis*; (2) *Th. C. mesomelas*; (3) *Thos C. barbarus* (= *Canis anthus* F. Cuvier, 1824); (4) *Thos vulgaris* (= *Canis aureus* Linn).

Vulpes (p. 1033); **Lupus** (p. 1039). These names are used in combination with specific names and correspond to super-specific divisions of his *Canis*, but are not employed in a manner that entitles them to recognition in nomenclature. Brisson and Oken are strictly comparable in their use of these names, which are not tenable from either of these authors.

Panthera (p. 1052); **Tigris** (p. 1054); **Leo** (p. 1070). Oken divides his genus *Felis* into four primary sections, to which he formally applies only vernacular names, as follows. 1. Luchse [*Lynx*]; 2. Pardel, Lunzen [*Panthera*]; 3. Tiger [*Tigris*]; 4. Lowen [*Leo*]; but under each, in enumerating the species, he employs with considerable consistency their Latin equivalents, namely (respectively), *Lynx*, *Panthera*, *Tigris*, and *Leo*. The

species indicated by Linnæus and Pallas by these names are obviously to be taken as the types of these groups.

Lynx = *Lynx* Kerr, 1792, and of such recent authors as have made use of the name.

Panthera includes all of the spotted cats, both large and small, which he subdivided into minor groups on the character of the markings, etc., he placing *Felis pardus* Linn. (= *F. panthera* Pallas) as "Art. 7. *P[anthera] vulgaris*." This should obviously be considered as the type of *Panthera*, of which Gray's *Leopardus*, as used by him in 1843 (*List Mamm. Brit. Mus.*, 1843, pp. 40-44), is practically equivalent.

Tigris and *Leo* respectively antedate *Tigris* and *Leo* of Gray, 1867, but are more comprehensive groups.

II. SPECIFIC NAMES.

Oken also gave many new specific names, he purposely re-naming many species already named, and giving names to many others he considered new. These names in some instances antedate others given later to the same species; in other cases Oken's names preoccupy names given later as new by other authors. In most cases his names are identifiable but fortunately in very few instances disturb current names. The following ten, relating to American species, are all that will be given special mention here. A few others appear to be available for Old World species.

Lepus chilensis (sub ***Viscaccia***), p. 836. The first name available for the Argentine Viscacha, having one year's priority over *Dipus maximus* Desmarest (1817, ex Blainville, MS.), as already shown in another connection. (Cf. *Proc. Biol. Soc. Wash.*, XV, 1902, p. —.)

Hystrix paraguayensis (sub ***Coendu***), p. 870. Based on 'Le Couiy' of Azara, for which it is the earliest name, antedating by six years *Spiggurus spinosus* F. Cuvier, 1822. The species should therefore stand as *Coendou paraguayensis* (Oken).

Lynx brasiliensis (sub ***Felis***), p. 1050. Not satisfactorily identifiable. Attributed to Paraguay. Not *Felis brasiliensis*

Schinz, 1821, and probably not *Felis brasiliensis* F. Cuvier, 1828.

P[anthera] paraguayensis (sub **Felis**), p. 1052. Includes (1) the 'Ocelot,' which he describes at length, and (2) the 'Chibi-guazu,' the latter after Azara. If the Ocelot can be excluded on the ground of its having been previously named, only Azara's 'Chibigouazou' would be left as the basis of Oken's *paraguayensis*, which antedates *Felis mitis* F. Cuvier (1820), *Felis wiedi* Schinz (1821 = *Felis macroura* Weid, 1826), and other names later applied to practically the same animal.

P[anthera] mexicana (sub **Felis**), p. 1054. In part, and so far as it has any substantial basis, this is the same as *Felis mexicana* Desmarest, 1816 (ex. Buffon, Hist. Nat., Suppl., III, 227, pl. xxxiv), and hence the two names are of even date. Also = *Felis novæ hispaniæ* Schinz, 1825. It is of course, as Buffon believed, the Serval.

Leo niger (sub **Felis**), p. 1070. The black phase of the 'Jagouarondi' = *Felis jaguarundi* Fischer, 1814.

L[eo] griseus (sub **Felis**), p. 1070. The 'Jagouarondi' of Azara; hence = *Felis jaguarundi* Fischer, 1814. Not *Leopardus griseus* Gray, 1842 = *Felis griseus* Gray, 1867.

L[eo] brunneus (sub **Felis**), p. 1070. The 'Pajero' or Pampas Cat = *Felis pajeros* Desmarest of same date. The last name having probably slight priority in date of publication, and also having obtained currency while the other has not, is to be preferred.

Did[elphys] paraguayensis, p. 1147. As already shown (*antea*, pp. 251, 267), this name is based on Azara's 'Micouré premier,' and hence supplants *D. azaræ* Temminck, 1825.

Did[elphys] mes-americana, p. 1152. As already shown (*antea*, p. 251) this is the earliest name for the large opossums of northern Mexico.

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palaeontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palaeontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	" 4.75	" " " II, 1899 " 2.00	
" III, 1890-91.....	" 4.00	" " " III, 1900 " 2.00	
" IV, 1892.....	" 4.00	" " " IV, 1901 " 1.75	
" V, 1893.....	" 4.00	" " (Complete). " 5.00	
" VI, 1894.....	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	" 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	" 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " 3.00	
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of *Diplodocus*. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)

A New Caribou from Ellesmere Land.

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN
OF THE
American Museum of Natural History,

VOL. XVI, ARTICLE XXXII, pp. 409-412.

New York, Oct. 31, 1902.

The Knickerbocker Press, New York

Article XXXII. — A NEW CARIBOU FROM ELLESMERE LAND.

By J. A. ALLEN.

The valuable natural history material brought by the Arctic explorer, Commander R. E. Peary, U. S. N., to the American Museum of Natural History on his return from his recent long sojourn in the high North contains five specimens of Caribou taken in Ellesmere Land, Lat. 79° , in June, 1902. They comprise four flat skins of adults without skulls, and more or less defective, and the complete skin of a young fawn. In coloration they are strikingly different from any other known Caribou, being pure white except for a large dark patch on the middle and posterior part of the back.

Rangifer pearyi, sp. nov.

ELLESMERE LAND CARIBOU.

Type, No. 19231 ♂ ad., Ellesmere Land, N. Lat. 79° , June 15, 1902, Commander Robert E. Peary, U. S. N.

Entire animal pure white except an oval grayish brown patch over the posterior half of the dorsal surface, gradually fading into white towards the shoulders, the hair being white to the base, or of a pale shade of lilac below the surface, where the surface color is white. The dorsal patch occupies an area of about 670 mm. in length by 350 mm. in width, and is drab-gray, divided by a very narrow median line of white. The legs and feet are wholly white; the ears are slightly tinged with gray, the hair beneath the surface being plumbeous and showing slightly at the surface. The antlers are just budding, being represented by small protuberances, about an inch and a half in length, covered with short hair. Total length of flat skin, 1660 mm. Corresponding measurement of flat skins of the dark form of Caribou from Greenland, 1820 mm.

A female (No. 19232) is similar, except that the dark dorsal area extends a little further forward at the shoulders, and is a little darker. As in the male, the patch fades out to whitish toward the shoulders. Length of the flat skin, 1560 mm.

Two other females are similarly marked, but the dorsal patch in both is much darker, approaching dark slate gray. The region around the base of the antlers and ears is clouded with grayish, as are the edges of

the ears; the front surface of the forelegs is dark grayish brown, and of the hind legs faint buffy grayish brown, increasing in amount and intensity apically from the tarsal joint to the hoofs. These skins measure respectively 1610 and 1570 mm. in total length. In one



Fig. 1. *Rangifer pearyi*, male (type). No. 19231, Ellesmere Land, June 15. Almost wholly white.

the antlers form knobs an inch or two in height, covered with short hair.

A fawn (No. 19235), a few weeks old, is grayish white on the head, ears, neck, limbs, ventral surface and sides of the body, the hairs being dusky basally and broadly tipped with white, the dusky basal portion

showing through the white enough to give a general dingy effect. The top of the nose and a narrow band bordering the nostrils are blackish, passing posteriorly on the upper part of the rostrum into brownish dusky; a broad central band from the nose nearly to the ears is darker



Fig. 2. *Rangifer pearyi*, female, No. 19232, Ellesmere Land, June 15.
White except the back, which is drab-gray.

or more dingy than the sides of the face; a rusty brownish spot marks the point where the antlers are to appear, and there is a faint rusty wash on the sides of the face both before and behind the rusty antler spots. The back is marked by a strongly defined, very narrow, ferrugineous line, running from the nape to the base of the tail, which, over

the middle of the back, broadens a little and darkens to deep dusky ferrugineous; the whole dorsal area, from a little behind the shoulders to the rump, is pale fawn color, darkest medially and fading out on the sides to pale buffy white. This colored area corresponds in position and outline with the dark dorsal patch of the adults. A narrow, ill-defined, dusky chestnut brown band borders the hoofs of all the feet, but is rather broader and more distinct on the hind feet than on the fore feet. The tail is wholly white to the base, as in the adults.

The adult specimens, though killed in June, are in winter coat, the hair being long, thick, and very soft, much softer and finer than in the Greenland Caribou, and the skins are also much thinner and softer. The skin of the fawn was preserved in brine, which may have slightly intensified or darkened the buffy shades of the dorsal surface.

Rangifer pearyi is evidently a very distinct insular form, very different from *R. grænländicus* in coloration and doubtless in other features. Unfortunately only flat skins are available for examination. Specimens of *R. grænländicus* in corresponding pelage are dark slaty brown above, this color fading gradually on the sides to the white of the ventral surface, the Greenland Caribou being very much darker in its winter pelage than the Newfoundland Caribou, which heretofore has been the whitest known form of the group.

I am indebted to Commander Peary for the following information regarding the occurrence of Caribou in Ellesmere Land. In a letter dated Philadelphia, October 13, 1902, he says: "In answer to your inquiries I will say that remains and traces of reindeer have been noted by previous explorers at the following points in Ellesmere Land and Grinnell Land: Alexandra Haven, Ellesmere Land; Rawlings Bay, Grinnell Land, and in the Fort Conger region, Grinnell Land; and an antler was picked up by a member of my party in the summer of 1901 at Erik Harbor, some twelve miles south of Cape Sabine. The published reports of Sverdrup's expedition state that he found reindeer in abundance on the west side of Ellesmere Land.

"I have seen many winter coats of the Greenland Caribou and they are pronouncedly darker than the Ellesmere specimens."

(Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 291 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, 1.25	
" II, 1887-90.....	4.75	" " " II, 1899 " " 2.00	
" III, 1890-91.....	4.00	" " " III, 1900 " " 2.00	
" IV, 1892.....	4.00	" " " IV, 1901 " " 1.75	
" V, 1893.....	4.00	" " (Complete). " " 5.00	
" VI, 1894.....	4.00	" XII, 1899.....	4.00
" VII, 1895.....	4.00	" XIII, 1900.....	4.00
" VIII, 1896.....	4.00	" XIV, 1900.....	4.00
" IX, 1897.....	4.75	" XV, Part I, 1901	3.00
" X, 1898.....	4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London ;
J. B. BAILLIÈRE ET FILS, Paris ; R. FRIEDLÄNDER & SOHN, Berlin ;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiiia-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.

PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.

PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)



*The Hair Seals (Family Phocidæ) of the
North Pacific Ocean and Bering Sea.*

By J. A. ALLEN.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

VOL. XVI, ARTICLE XXXIV, pp. 459-499.

New York, Dec. 12, 1902.

The Knickerbocker Press, New York

Article XXXIV. — THE HAIR SEALS (FAMILY PHOCIDÆ) OF THE NORTH PACIFIC OCEAN AND BERING SEA.

By J. A. ALLEN.

Figs. 1-10.

CONTENTS.

Introduction.....	459
Nomenclature.....	461
The generic name <i>Phoca</i>	461
Specific names.....	462
Sexual differences in dentition in <i>Phoca vitulina</i>	467
Comparison of the Atlantic and Pacific forms of the <i>Phoca</i>	471
<i>vitulina</i> group.....	471
Cranial differences.....	471
Dental characters.....	471
Supernumerary teeth.....	473
The North Pacific Phocidæ (with descriptions of new forms)....	473

INTRODUCTION.

Among the mammals collected by Mr. N. G. Buxton and Mr. W. Bogoras in northeastern Siberia, on the Jesup North Pacific Expedition, are specimens of three species of Hair Seals. An attempt to identify these has rendered necessary their comparison with such other material from northeastern Asia and northwestern North America as could be brought together, so that the present paper may be considered as a preliminary revision of the seals of the family Phocidæ known to occur in the North Pacific. Although the material available for examination is scanty, it is sufficient to show that the name *Phoca largha* Pallas, as recently misapplied, includes at least three species, the proper identification of which involves the consideration of difficult questions of synonymy.

In this connection it gives me pleasure to acknowledge my indebtedness to Mr. Gerrit S. Miller, Jr., Curator of Mammals in the U. S. National Museum, for kindly securing for me the

use of the material under his charge, consisting of specimens from the coast of Alaska, the Commander Islands, and the eastern coast of Kamschatka; and to Mr. Witmer Stone of the Academy of Natural Sciences of Philadelphia, and Dr. Horace Jayne, Director of the Wistar Institute of Anatomy and Biology of Philadelphia, for the large series of seal skulls collected by Mr. E. A. McIlhenny at Point Barrow; and to Mr. Outram Bangs, Curator of Mammals at the Museum of Comparative Zoölogy, Cambridge, Mass., for several skulls of special interest. I am also greatly indebted to Dr. L. Stejneger for field notes and measurements of the seals collected by him at the Commander Islands and on the coast of Kamschatka, without which and the specimens collected by him there would have been little basis for the present paper.

I must confess much disappointment in finding so little material available for the study of the seals of the Pacific coast of North America. Applications made to the three leading Natural History Museums of the Pacific coast for skulls of California seals resulted only in the information that these institutions had none in their collections. It was also a matter of surprise to find that the U. S. National Museum had so few skulls of seals from Alaska and the Pribilof and other Alaskan Islands, considering the large number of naturalists and collectors who have visited this region in its interests in recent years. The only material available for examination from south of Puget Sound consists of one skull and one mounted specimen from the Santa Barbara Islands.¹ There are two immature specimens (and some fragments of others) from the vicinity of Puget Sound, two skulls only from Alaska south of St. Michaels, a small series of quite young skulls from St. Michaels, and three from the Pribilof Islands. Furthermore, none of this material is identified as to sex. In animals which vary so greatly with age and sex as do the seals of the present group, the inadequacy of such material as I have been able to bring together, as regards both quantity and quality, for more than a superficial view of the field is readily

¹ As these pages are passing through the press I am in receipt, from Dr. C. Hart Merriam, Chief of the Biological Survey of the U. S. Department of Agriculture, of four skulls of *Phoca* from San Geronimo Island, Lower California, as noted below, p. 493.

apparent. It may, however, serve to direct attention to this neglected group of mammals, and possibly stimulate the gathering of material for the use of future investigators.

The case is hardly better when we turn to the seals of the eastern coast of North America. While the Harbor Seal of southern Greenland appears to differ, at least sub-specifically, from that of the coast of New England and New York, very little material bearing on the question can be obtained. Nor is there much for the comparison of the Harbor Seal of eastern North America with the Harbor Seal of Europe.

NOMENCLATURE.

The Generic Name Phoca.

First, as to the generic name *Phoca*. As shown by me many years ago (Hist. N. Am. Pinnipeds, 1880, pp. 417, 418, 558) the process of elimination, strictly enforced, would necessitate the restriction of the name *Phoca* to the *Phoca leonina* Linn. Linnæus in 1758 (Syst. Nat., 10th ed., pp. 37, 38) included four species in the genus *Phoca*, namely, (1) *Phoca ursina*, (2) *Phoca leonina*, (3) *Phoca rosmarus*, (4) *Phoca vitulina*. *Phoca rosmarus* was removed by Linnæus in 1776 to *Trichechus*, and *Otaria* was established in 1816 for the Eared Seals, leaving in *Phoca* at this date only *Phoca leonina* and *Phoca vitulina*. In 1826 *Phoca vitulina* was made by F. Cuvier the type of his genus *Calocephalus*, and *Phoca leonina*, in the same memoir, was made the type of his genus *Macrorhinus*, leaving nothing to represent the old Linnæan genus *Phoca*. *Calocephalus*, however, has precedence by eighteen pages over *Macrorhinus*. Besides this, *Macrorhinus* of F. Cuvier is preoccupied by *Macrorhinus* Latreille, 1825, for a genus of Coleoptera, and has had to give way to *Mirounga* Gray, 1827. When *Calocephalus* was established, only *Phoca leonina* was left to bear the restricted name *Phoca*. In view of all this, plainly set forth in 1880, when rules of nomenclature were less rigidly enforced than at present, I then pleaded for the retention of *Phoca* as the generic name of the Harbor Seal, as follows: "This, however, seems so contrary to the traditions

of *Phoca*, which from 1735 to the present day has been generally associated by the majority of writers with *vitulina* and its nearest allies, that it seems an act of violence to transfer it to what is logically its legitimate connection with *leonina*, thereby making *Macrorhinus* a synonym of the restricted genus *Phoca*. . . . In view of the tradition and usage of the case it seems best to waive the technicality here involved and suffer *Phoca* to retain its time-honored associations."

The only way, however, to retain *Phoca* for the *Phoca vitulina* group is to invoke Canon XXIII of the American Ornithologists' Union 'Code of Nomenclature,' which provides as follows: "If, however, the genus contains both exotic and non-exotic species,—from the standpoint of the original author,—and the generic term is one originally applied by the ancient Greeks or Romans, the process of elimination is to be restricted to the non-exotic species." As the Harbor Seal is, or was formerly, a common species in the Mediterranean, as well as on the western shores of Europe, and was the only seal really known, not only to the ancients but to the early natural-history writers, as Rondelet, Olaus Magnus, Gesner, and Aldrovandus, and down to about 1750, it meets the requirements of Canon XXIII as against its competitor, the *Phoca leonina* of Linnæus, which was practically first made known by Lord Anson in 1748.

Specific Names.

In case the Harbor Seal of eastern North America proves separable from true *Phoca vitulina* of Europe, as seems almost certain, an available name for the southern form is found in *Phoca concolor* Dekay (1842), based on New York examples of the light phase.

The nomenclature of the North Pacific species seems at first sight highly complicated, but a careful examination of the early names shows that they have very little basis and that most of them should be rejected as unidentifiable. The names to be here especially considered are, in the order of date, as follows: (1) *Phoca largha* Pallas, 1811; (2) *Phoca*

ochotensis Pallas, 1811; (3) *Phoca tigrina* Lesson, 1827; (4) *Phoca chorisi* Lesson, 1828; (5) *Phoca nummularis* Temminck, 1842; (6) *Halichærus antarcticus* Peale, 1848; (7) *Halicyon richardii* Gray, 1864; (8) *Phoca pealii* Gill, 1866; (9) *Halicyon ? californica* Gray, 1886. Only five of these names — *Phoca largha* Pallas, *Phoca ochotensis* Pallas, *Halichærus antarcticus* Peale, *Phoca nummularis* Temminck, and *Halicyon richardii* Gray — are entitled to serious consideration.

The *Phoca tigrina* of Lesson was based on the 'Phoque tigré,' figured by Kraschenninikow in his 'Histoire de Kamtschatka' as inhabiting the coast of Kamschatka, and may be either of three very distinct species of spotted seals now known to inhabit this coast, and is therefore unidentifiable.

The *Phoca chorisi* of Lesson, founded on a figure by Choris, published without any descriptive detail (Voy. Pittoresque, plate viii), of his 'Chien de mer de Détroit de Behring,' is likewise indeterminate.

Phoca pealii Gill is a synonym of *Halichærus antarcticus* Peale, the latter being an avowed substitute for Peale's name.

Gray's *Halicyon ? californica*, based on the "Hair Seal, *Phoca jubata*" of Hutching (Scenes of Wonder and Curiosity in California, p. 189), has of course no standing.

Taking up the other names in chronological order, the first is the *Phoca largha* of Pallas, which has of late been revived for the large spotted seals of the North Pacific, and used, as the present material shows, for the designation of several quite distinct species. Pallas's *Phoca largha* is, however, unidentifiable and therefore not available for any of the species to which it has been applied. His description,¹ based on an imperfect skin, which lacked the head, is not diagnostic, there being no indication of the size of the animal, nor mention of any character that may not apply to any of the several species of spotted seals found along the coast of Kamschatka. He gives the Russian name as 'Nerpa,' and says that it is also called 'Largha' on the eastern coast of Kamschatka. According to Mr. Buxton's notes, the name Nerpa is applied,

¹ "P. capite — — corpore supra nitide albente, maculis nigris ovalibus sparso." — Zoog. Rosso-Asiat., I, 1811, p. 133.

on the Siberian coast, to *Erignathus barbatus*, and the name Largha to the larger spotted seal of the same region.

The history of the use of the name *Phoca largha* Pallas is briefly as follows: In 1850 (Cat. Seals, p. 54) and later (Cat. Seals and Whales, 1870, p. 24) Dr. J. E. Gray identified it with Temminck's *Phoca nummularis*. It having been found that the spotted seals of the Pribilof and Commander Islands were not *Phoca vitulina*, Pallas's name *largha* has recently been applied to them, without, however, any discussion of its availability. It appears to have been first used in such a connection by Dr. L. Stejneger in 1896, in his report on 'The Russian Fur-seal Islands' (Bull. U. S. Fish. Comm., Vol. XVI, 1896, p. 21), where *Phoca largha* appears in a brief enumeration of the marine mammals occurring on the Commander Islands. When this report was republished two years later in Jordan's 'Report on the Fur Seals and the Fur-Seal Islands of the North Pacific' (Part IV, 1898, p. 30) a footnote was added, referring to the name *Phoca largha*, stating: "During 1896 there were killed 49 'Nerpi' on Bering Island and 22 on Copper Island," thus again connecting the name Nerpa with *Phoca largha*. Mr. F. W. True in 1899 (Jordan's Fur Seal Report, Part III, p. 351), in a paper on the 'Mammals of the Pribilof Islands,' tentatively used the name "*Phoca largha* Pallas?" for "the hair seal found about the islands," apparently taking Dr. Merriam as his authority for its probable identification "with the *P. largha* of Pallas."

It is doubtless on this basis that the name was used, *passim*, in the same volume by Messrs. Stiles and Hassell in their memoir on the 'Internal Parasites of the Fur Seal,' in enumerating the hosts of the various species of parasites there described. The name has since been accepted in the same sense by Mr. Witmer Stone (Proc. Acad. Nat. Sci. Phila., 1901, p. 43); by Mr. D. G. Elliot (Synop. N. Am. Mamm., Dec., 1901, p. 363), and by Miller and Rehn (N. Am. Mamm., Dec., 1901, p. 194). The material now in hand and referred to respectively by Stejneger, Merriam, True, and Stone, shows that the name as used by these authors covers three very distinct species, as will be shown later in the present paper.

Pallas's *Phoca ochotensis* (Zoog. Rosso-Asiat., I, 1811, p. 117) seems available for the larger spotted seal of the Okhotsk Sea, as will be shown later in treating of that species.

The next name requiring careful consideration is the *Phoca nummularis* Temminck (Fauna Japonica, Mamm. Marine, 1842, p. 3). He says: "Le troisième Phoque des parages septentrionaux de l'océan pacifique nous est connu d'après trois jeunes individus et d'après un nombre égal de peaux incomplètes d'individus adultes, tous rapportés du Japon par M.M. de Siebold et Bürger. C'est évidemment le deuxième Phoque de Steller, Descr. du Camtsch. p. 107, et l'espèce dont Pallas fait mention en traitant du Phoque commun, l. c. [Zoog. Rosso-Asiat., I,] p. 117, nota 2; puis le Phoque, figuré sans le moindre détail descriptif, dans le voyage de Choris, Pl. 8, sous le nom de Phoque du détroit de Behring; peut-être convient-il également de rapprocher de cette espèce inédite le *Phoca largha* de Pallas, ibid. p. 113, n° 43. Quoi qu'il en soit, nous avons cru devoir conférer à ce Phoque le nom qu'il porte, suivant Pallas, l. c. p. 117, chez les Russes, savoir celui de Phoque nummulaire, *Phoca nummularis*."

Temminck describes his six skins in detail, and comments upon their wide range of color-variation. He also describes the three imperfect skulls that accompanied the skins, and points out their resemblance to the skull of the "Phoque à croissant [*Phoca grænlandica*], notamment par la configuration de la région interorbitaire, qui est, par devant, plus large que dans le crâne du Phoque annelé [*Phoca hispida*]. Quant au système dentaire, il n'offre pas la moindre disparité de celui du Phoque à croissant et du Phoque annelé." He concludes: "Ce Phoque est en quelque sorte intermédiaire entre le Phoque à croissant . . . et le Phoque annelé . . .; car il offre beaucoup d'analogie avec le premier par la configuration de son crâne, notamment par celle de la région interorbitaire ainsi que par celle de ses dents, tandis qu'il se rapproche davantage du second par son système de coloration."

Later the skull fragments described by Temminck were examined by J. E. Gray, who states (Proc. Zoöl. Soc. London, 1864, pp. 31, 32) that "they are nearly all from very young [December, 1902.]

specimens of nearly the same age." He compares these fragments with the corresponding parts in *Phoca fætida* and says: "The general form and size of the face, and the form of the teeth, are very similar to those of a skull of *Pagomys fætidus* of the same age." He adds that "the grinders" are "larger, thicker, and rather closer together, the central lobe of the grinders being considerably larger, thicker, and stronger, and all of the lobes of the grinders being more acute." Gray's comparative measurements of *Phoca fætida* and *P. nummularis* show that the latter is very much smaller than *P. fætida* and indicate a species much below the size of any species of *Phoca* known to me. The name *Phoca nummularis*, therefore, cannot apply to any of the species represented by the material here under consideration. All that we thus far know of *Phoca nummularis* points to a species very similar in coloration to *Phoca fætida*, but smaller and with heavier dentition—features which may characterize a species of seal found in Japan, and still practically unknown, and certainly not known to occur elsewhere.

The next name in order of date is *Halichærus antarcticus* Peale. As long since pointed out by Dr. Gill (Proc. Essex Inst., Vol. V, 1866, p. 4, footnote), "The *Halichærus antarcticus* of Peale . . . is a typical species of *Phoca*"; and he adds that it "appears to be identical with a species occurring along the California and Oregonian coasts, and consequently there must be some error as to its assigned habitat in the Antarctic seas. I am happy to add that Mr. Peale himself now doubts the correctness of the labels on the faith of which he gave its habitat [Desolation Island], and as a change of name is desirable, I would propose that of *P. pealii*." I have examined this skull,¹ but cannot quite agree with Dr. Gill in his determination of the species. It is a rather young skull and apparently a female, but in one important particular it does not agree with the Harbor Seal occurring along the Pacific coast of the United States. Since, however, it does agree with the Atlantic coast form, the name must be synonymized with *Phoca vitulina*. Where the skull actually came

¹ See Hist. N. Amer. Pinnipeds, 1880, pp. 580, 581, figs. 44, 46.

from, and how it obtained its erroneous locality label, are mysteries that will probably never be solved. As shown by my figures of the specimen (*l. c.*, p. 580, fig. 45), the premaxillæ scarcely reach the nasals, instead of touching them for a greater or less distance, as in all of the Pacific coast specimens of the *Phoca vitulina* group available for examination (see *postea*, p. 471). We are thus fortunately able to avoid the use of the very objectionable name *antarcticus* for any of the North American species of *Phoca*.

The next name in order of date is the *Halicyon richardii* of Gray, 1864 (*P. Z. S.*, 1864, pp. 28-31, figs. 1 and 4), based on specimens from "Fraser's River and Vancouver Island." Later (*Cat. Seals and Whales*, 1866, p. 301) these are said to consist of a skeleton from Fraser's River and a skull "obtained from the west coast of Vancouver's Island." Mr. J. W. Clark, however, says (*P. Z. S.*, 1873, p. 336) that *Halicyon richardii* Gray was "described from a single skull from Vancouver Island." Which of the skulls is figured is not stated. The name is available for the Hair Seal of Vancouver Island and neighboring coasts, and is the first name unequivocally pertinent to any North Pacific seal of the *Phoca vitulina* group.

SEXUAL DIFFERENCES IN DENTITION IN PHOCA VITULINA.¹

Figs. 1-4.

There are eleven skulls of Harbor Seals in the osteological collection of the American Museum of Natural History, of which ten have the sex indicated, the specimens having been received at the Museum in the flesh from various menageries, chiefly from the Central Park Menagerie and the Aquarium, New York City. They are all 'young adults,' from unknown localities, but presumably all are from the eastern coast of the United States and probably mostly from the coast of Maine. The sexed skulls embrace three males and seven

¹ In the absence of a series of authentic skulls of the true *Phoca vitulina* of Europe, the name is here used only tentatively for the so-called Harbor Seal of the Atlantic coast of North America. This seal certainly differs from any seals of the Pacific coast of North America, and in all probability is separable from the Harbor Seal of Europe. In case this proves to be as here conjectured, the name *Phoca concolor* Dekay, as said above, will be available for the seal of the eastern coast of the United States.

females. In addition to these are two skulls from the coast of Maine, sexed as male and female, received for examination from the U. S. National Museum, making 13 in all. This material shows that the tooththrow in the females is fully as long as in the males, but that the individual teeth are very much heavier in the males, so that while in the females the teeth, except pm^2 and pm_3 , stand in a straight line one behind the other, with little or no obliquity of insertion, in the males the teeth are so much larger that there is not room for them in a straight line, and the axis of insertion for two of the upper and three of the lower teeth (pm^{2-3} and pm_{2-4}) is more or less oblique to the axis of the jaw, the divergence in the two axes amounting in some cases to fully 45° .

Male. — In the male pm^1 is small and conical and generally has a more or less oblique insertion at the postero-inner base of the canine; pm^2 and pm^3 are much larger, subequal, and inserted obliquely to the axis of the tooththrow, the angle being greater in pm^2 than in pm^3 , and varying in different individ-

uals; in pm^4 and m^1 the axis of insertion is usually parallel to the axis of the tooth row.

The upper teeth, except pm^1 , are usually tricuspid, pm^2 , pm^3 , and pm^4 having a main cusp — high, pointed, and directed backward — and two accessory cusps behind it, the anterior cusp being either wholly suppressed or present as

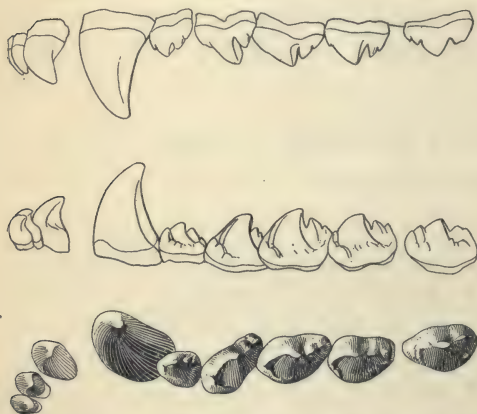


Fig. 1. *Phoca vitulina*, 'young adult' ♂. Am. Mus. No. 13969, probably from coast of Maine. Upper dentition, outside, inside, and crown views of teeth. Nat. size.

a rudiment. In pm^3 the posterior cusp is sometimes suppressed or so rudimentary that the tooth is practically bicuspid instead of tricuspid. The same exceptional con-

dition occurs less frequently in pm^2 . The molar is tricuspid, but in a different way, there being an accessory cusp both before and behind the main cusp; the accessory cusps are subequally developed, but generally the posterior is larger than the anterior, which latter is sometimes quite obsolete.

In the lower jaw the teeth are much heavier than in the upper jaw, more serrated, and more crowded, and more given to the development of what may be termed adventitious cusps. Pm_{2-4} normally considerably

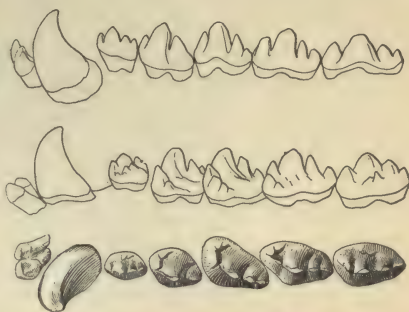


Fig. 2. *Phoca vitulina*, 'young adult' ♂. Am. Mus. No. 13969, probably from coast of Maine. Lower dentition, outside, inside, and crown views of teeth. Nat. size.

overlap each other and have a very oblique insertion, pm^2 and pm_3 being set rather more obliquely than pm_4 , the molar alone usually having the axis of insertion parallel to the axis of the tooth-row. The teeth are usually 4-cusped, but not infrequently 5-cusped, more rarely 6-cusped, there being a main, high-pointed cusp, with two well defined cusps behind it and one or two, and sometimes three, in front of it, the inner front border of the cingulum in heavy

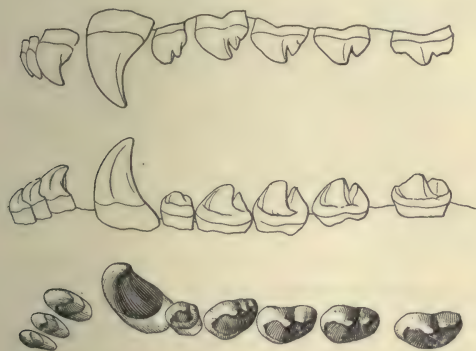


Fig. 3. *Phoca vitulina*, 'young adult' ♀. Am. Mus. No. 14442, probably from coast of Maine. Upper dentition, outside, inside, and crown views of teeth. Nat. size.

unworn teeth being often serrated with cusplets which increase in size toward the main cusp. The molar has normally four simple subequal cusps, the second or main one being the

largest and the second posterior cusp the smallest; sometimes there are two points in front of the main cusp, making five in all; sometimes the last posterior cusp is obsolete or barely indicated, its development greatly varying in different specimens. In addition to the variations above noted in the number of cusps on the molar, a cusp, sometimes of considerable size, but usually rudimentary, is developed at the inner base of the main cusp, and in rare instances another, much smaller, at the base of the cusp next behind the main cusp.

Female. — The teeth are about one half smaller and less obliquely inserted than in the male, and often vary from the male dentition in the reduction of the cusps, both in size and number. The internal accessory cusps, so often seen in the male, seem to be uniformly absent.

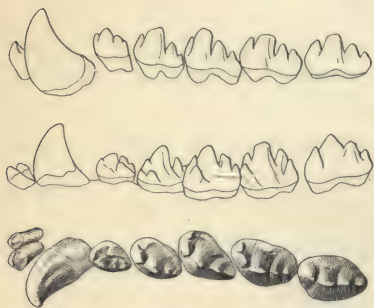


Fig. 4. *Phoca vitulina*, 'young adult' ♀. Am. Mus. No. 14442, probably from coast of Maine. Lower dentition, outside, inside, and crown views of teeth. Nat. size.

The teeth vary notably in the development of cusps in both sexes, as does also the size of the teeth. Some females have nearly as heavy dentition as some males, so that through the wide range of individual variation in

this respect, one cannot be sure whether in skulls not marked for sex a skull with rather weak dentition is a heavy-toothed female or a light-toothed male.¹

¹ Among the thirteen skulls here under consideration are three that differ strikingly from the rest of the series. Two of them were received from Messrs. Barnum and Bailey, and the other, at about the same date, from the Central Park Menagerie. These three skulls, sexed as female, uniformly differ from the others in having only three cusps instead of four on the lower molar. In one (No. 6366) there is a rudimentary second posterior cusp, about as large as a small pin point. This skull agrees with the only skull (No. 32) of known European origin available for examination, and I strongly suspect that these three aberrant skulls are also European, and that the animals were obtained through the well-known European dealer in menagerie specimens, Carl Hagenbeck. If this conjecture is correct, the difference in the form of the last molar will serve as a good distinguishing character between the females of the European and North American Atlantic coast Harbor Seals.

These same skulls differ from the other female skulls in lacking one cusp throughout both the upper and lower premolar-molar series, the upper premolars lacking the second posterior cusp, being bicuspid instead of tricuspid, while in the lower jaw there is a corresponding reduction in the number of cusps.

COMPARISON OF THE ATLANTIC AND PACIFIC FORMS OF THE
PHOCA VITULINA GROUP.

The skulls of the *Phoca vitulina* group available for study from the coasts of the North Pacific and Bering Sea number 26. They include 1 from Santa Barbara Islands; 2 from Puget Sound; 1 from Yakutat Bay; 1 from Kenai, Alaska; 1 from Adakh Island, Aleutian Islands; 4 from St. Michaels. To these may be added 4 from Point Barrow; 3 from the Pribilof Islands; 4 from Bering Island; 2 from Avatcha Bay, Kamschatka; 5 from mouth of Gichiga River, Okhotsk Sea. The Point Barrow, Kamschatkan, and Okhotsk specimens, however, represent species quite distinct from those from the Pacific coast of North America. Hence the really available material for comparison with the Atlantic coast specimens consists of the skulls from the Pribilof Islands and St. Michaels, Alaska, and a few from more southern points on the Pacific coast. These are nearly all young, and not one is identified as to sex. The general appearance of the St. Michaels skulls seems to indicate that three of them are females and the other a male. These and the other Pacific coast skulls, compared with Atlantic coast skulls of closely corresponding ages, show the following resemblances and differences.

Cranial Differences. — In the Pacific coast skulls the premaxillæ ascend not only to the nasals but extend posteriorly so as to touch the sides of the nasals for about 8 to 10 mm.; in the Atlantic coast specimens the premaxillæ barely touch the nasals (in some cases do not quite reach them)—a distinction, according to Dr. True, first made known by Dr. Merriam.¹ This distinction appears to be constant in all the skulls I have examined from the Alaskan and Kamschatkan coasts, as compared with those of the Atlantic coast.

Dental Characters. — A careful comparison of the Alaska and Puget Sound skulls, tooth by tooth, with the Atlantic coast specimens, reveals no tangible differences between the

¹ Cf. True, in Jordan's 'Report on the Fur Seals and Fur-Seal Islands of the North Pacific Ocean,' Part III, 1890, p. 351. At a meeting of the Biological Society of Washington, held Jan. 30, 1897, Dr. Merriam is recorded (Proc. Biol. Soc. Wash. XI, 1897, p. viii) as having presented a communication on 'The Pribilof Island Hair Seal,' but the paper does not appear to have been published.

two series. In all of the Pacific coast skulls that have the general appearance of being female the lower molar has only three cusps, while all the skulls that are apparently male have four, as in the Atlantic coast form. Thus in No. 9480 (Nat. Mus.), from Kenai, No. 21476, from St. Michaels, and No. 6486 from Washington the lower molar has four cusps, as in male skulls from the Atlantic coast. The premolars are also all similar in the two series, except for the larger size of the teeth of the males, in both series. This is contrary to Dr. Merriam's discovery (as reported by Dr. True, *l. c.*), that: "In *P. vitulina* the lower premolar [= premolars ?] and molar have usually four cusps each, but in the Pribilof seal three." A large fully mature skull from the Pribilof Islands (Nat. Mus. No. 49550), apparently a female, and probably one of the skulls examined by Dr. Merriam, agrees with the supposed female skulls from St. Michaels. In another Pribilof skull, from St. George Island (Nat. Mus. No. 101330), also without indication of sex but apparently a male, the lower molar has four cusps, as in *Phoca vitulina*.

In a very old heavily ossified skull (Mus. Comp. Zool. No. 6157) from Santa Barbara Islands, evidently a male, the right lower molar has four cusps, and the left lower molar three, with the fourth distinctly indicated but very small.

In a series of four skulls from Bering Island, collected by Dr. Stejneger, unmarked as to sex, three of which are very old and the other quite immature, the lower molars in all of the old skulls are distinctly 4-cusped; in the young skull the left lower molar is just as distinctly 3-cusped, while the right lower molar is 4-cusped! (See Fig. 9, p. 490.) Also, in four skulls (received since the above was put in type) from San Geronimo Island, L. Cal., two of which are male and two female, the number of cusps on the lower molar varies in both sexes and also on the two sides of the same jaw from three to four.

The relative size and mode of implantation of the teeth in the jaws (both upper and lower) is the same in specimens from the west coast of North America as in those from the east coast, with the same great sexual difference in size, and in the position of the teeth in the jaw.

From the foregoing it is evident that the number of cusps, whether three or four, is in part a sexual character, and in part due to individual variation, and does not serve to distinguish Atlantic coast from Pacific coast specimens.

Supernumerary Teeth.—In addition to the tendency to the development of supernumerary or adventitious internal cusps on the last molar, and to individual variation in the number of what may be termed normal cusps, already noted, the frequency of supernumerary teeth in the seals of the *Phoca vitulina* type is a matter of interest. The series of 26 North Pacific and Bering Sea skulls contains 5 cases of supernumerary teeth, as follows:

No. 6970, Mus. Comp. Zool., Plover Bay, Siberia. Alveolus on left side for a supernumerary pm, in front of pm¹, apparently of nearly the normal size of pm¹.

No. 21312, Nat. Mus., Bering Island. A supernumerary incisor between i¹ and i² on the right side, nearly equalling in size the normal incisors.

No. 101330, Nat. Mus., St. George Island, Pribilof Islands. Supernumerary premolar on right side, between pm³ and pm⁴, about the size and shape of pm¹; on the left side a supernumerary tooth between pm⁴ and the molar, also of about the size and shape of pm¹.

No. 82820, Nat. Mus., Coast of Maine. A supernumerary premolar in the lower jaw, *inside the tooth line* opposite pm₁ on the left side, larger than a normal pm₁, and in form a miniature pm₂.

No. 22, McIlhenny Collection (Acad. Nat. Sci. Phila.), Point Barrow, Alaska. A supernumerary tooth inside the tooth line on the right side, opposite pm¹, and about one third the size of a normal pm¹.

NORTH PACIFIC PHOCIDÆ.

1. *Erignathus barbatus* (Fabricius).

BEARDED SEAL.

Erignathus barbatus MURDOCH, Rep. Point Barrow Exped. 1885, 95 (Point Barrow). — NELSON & TRUE, Rep. Nat. Hist. Coll. Alaska, 1887,

259 (St. Michaels, Sledge Islands, Cape Prince of Wales, Alaska).—STONE, *Proc. Acad. Nat. Sci. Phila.*, 1900, 43 (Point Barrow).

Siberian specimens do not appear to differ appreciably from Greenland examples, on comparison of series of six or eight skulls of each. Mr. Bogoras, however, informs me that the form occurring in the Okhotsk Sea is considerably smaller than that found along the northeastern coast of Siberia.

According to Mr. Nelson, the Bearded Seal is "rather common along the Alaskan coast of Bering Sea south to Bristol Bay." Murdoch states that it is not rare at Point Barrow, where it occurs at all seasons, but is most common in summer and autumn. On the Siberian side it ranges southward to the Okhotsk Sea, where several specimens were secured by Mr. Buxton for the American Museum. Mr. Bogoras obtained others from the Anadyr coast, northeastern Siberia.

2. *Histiophoca fasciata* (Zimmerman).

RIBBON SEAL.

Phoca dorsata PALLAS, *Zoog. Rosso-Asiat.* I, 1811, 112, part (Olotura, coast of Kamschatka = Olintorsk of modern maps). Cf. Nordquist, *Vega-Exped. Vetensk. Iakt.* II, 1883, pp. 110, 111.

Phoca (Histiophoca) fasciata TRUE, *Amer. Nat.* XVII, July, 1883, 798; *Proc. U. S. Nat. Mus.* VI, April, 1884, 417, 426, pls. xi-xiv, skull, osteological characters, and skeleton (Plover Bay, Siberia, and Cape Romanzoff, Alaska).

Histiophoca fasciata NORDENSKIÖLD, *Voy. Vega, Engl. ed.* 1882, 563 (fig. of animal), 565, 590 (St. Lawrence Island, Bering Sea).—MURDOCH, *Rep. Point Barrow Exped.*, 1885, 97 (Point Barrow, rare).—TRUE, in *Jordan's Rep. Fur Seals and Fur-Seal Islands*, part iii, 1889, 351 (St. Paul Island, as a straggler).

Phoca fasciata NORDQUIST, *Vega-Exped. Vetensk. Iakt.* II, 1883, 107, figs. 16-18, skull, fig. 19, color pattern (Kamschatka).—NELSON & TRUE, *Rep. Nat. Hist. Coll. Alaska*, 1887, 261 (south to Cape Vancouver, Alaska).—STEJNEGER, *Bull. U. S. Fish Comm.*, XVI, 1896, 21 (Commander Islands).

This species is restricted to the North Pacific, and appears to be rare on the Alaskan coast, and rather more common, but not numerous, on the coast of Siberia, occurring as far south, according to Von Schrenck, as the Okhotsk Sea. Pallas states that it was formerly found at the Kurile Islands.

Murdoch records it as of rare occurrence at Point Barrow, and True mentions the capture of a young female by sealers near St. Paul Island. Dall obtained specimens at Cape Romanzoff. Nelson gives its southern limit as "about the rocky shores of Nunevak Island and Cape Vancouver. Stray individuals may occur about the mouth of the Koskoquim River, but if so they are very rare."

(?) 3. *Phoca (Pagophilus) groenlandica* (Fabricius).

HARP SEAL.

Phoca groenlandica NORDQUIST, Vega-Exped. Vetensk. Iakt. II, 1883, 105 (ex *P. dorsata* Pallas). Reported as not seen east of White Island, off the Gulf of Obi.

Phoca groenlandica NELSON & TRUE, Rep. Nat. Hist. Coll. Alaska, 1887, 263 (Wrangle and Herald Islands).—STEJNEGER, Bull. U. S. Fish Comm. XVI, 1896, 21 (Commander Islands, on the authority of previous writers.)

I have never seen a specimen of this species from the North Pacific. It was recorded in early days by Steller and Pallas as occurring on the coast of Kamschatka. Mr. Nelson mentions "a skin of a young specimen" brought to him at St. Michaels, by a native, from Cape Prince of Wales. He also states: "During the cruise of the 'Corwin' in the summer of 1881 I was fortunate enough to add a little to the known distribution of the 'Saddle-back.' While cruising among the ice about Wrangel and Herald Islands several adults were seen, some of which were within a very short distance of the vessel. On August 12, in particular, while we were steaming through the pack off the shore of Wrangel Island, two of these seals were seen close alongside. One came up within twenty yards of us and gazed curiously at the vessel as it pushed against a slowly-yielding mass of ice. The chestnut brown of the animal's head was very conspicuous, and I called Captain Hooper's attention to it, whereupon he said that he had seen a number of these animals in the pack along this coast while there the previous year. This is good evidence that the Saddle-back is a regular and not uncommon summer resident of the ice-pack northwest of Bering Straits, and it probably winters there as well. South of Bering Straits its range

appears to coincide very closely with that of the Ribbon Seal, but it is very much less common."

As already said, I have never seen a specimen of *Phoca grænlandica* from the North Pacific, nor from Bering Sea, nor can I find any record of a specimen taken in these waters except as recorded by Pallas, who refers, under his *Phoca dorsata*, to its occurrence "in mari Camtschatico praesertim circa Olutora observatur, indeque versus arcticum fretum passim habitat." As his *Phoca dorsata* has been currently synonymized with *Phoca grænlandica* (as it obviously is in part), the Kamschatkan record has been accredited to *Phoca grænlandica*. Temminck mentions having seen three skins obtained at "Sitka," but this locality is obviously erroneous.

In writing to Dr. Stejneger, while preparing this paper, I expressed doubt of the occurrence of *Phoca grænlandica* in the North Pacific or adjacent arctic waters, and asked him to kindly inform me whether Nordquist recorded specimens taken there during the voyage of the 'Vega,' the report on the scientific results of this voyage not being then accessible to me.¹ Under date of November 7, 1902, he says: "His [Nordquist's] only authority for *Ph. grænlandica* in Kamschatka is the assumption of its identity with Pallas's *Ph. dorsata*, and he adds (p. 106): 'In the Zoöl. Museum of the Academy of Sciences in St. Petersburg there are found a few skulls and skins under the name of *Phoca dorsata* with the statement that they are from Kamschatka. They belong without doubt to females and young males of *Phoca fasciata*. . . . For the present the occurrence of this species in the Pacific seems very improbable.'"

The vicinity of Wrangel Island is of course outside of the geographical limits of the present paper; but Mr. Nelson's observations are of special interest in this connection as extending the known range of *Phoca grænlandica* far to the eastward of its previous recorded occurrence. Nordquist states that it was not observed on the 'Vega' Expedition east of White Island, near the mouth of the Gulf of Obi,

¹ Through the kindness of Dr. Stejneger I have been able, since this matter was put in type, to consult Nordquist's Report.

although the region to the eastward was traversed and the 'Vega' wintered off the northeast coast of Siberia.

Although there is no satisfactory evidence of the occurrence of *Phoca grænlandica* in the North Pacific nor in Bering Sea, the species is included partly for the reason of its previous records from this region, and partly for the purpose of calling attention to the unsatisfactory evidence of its claim to a place in the list of North Pacific seals.

4. *Phoca (Pusa) hispida* (Schreber).¹

RINGED SEAL.

Phoca fætida NORDQUIST, Vega-Exped. Vetensk. Iakt. II, 1883, 104 (Bering Island).—MURDOCH, Rep. Point Barrow Exped. 1885, 95 (Point Barrow).—NELSON & TRUE, Rep. Nat. Hist. Coll. Alaska, 1887, 261 (Unalakleet and St. Michaels, Alaska).—STEJNEGER, Bull. U. S. Fish Comm. XVI, 1896, 21 (Commander Islands).—STONE, Proc. Acad. Nat. Sci. Phila. 1900, 44 (Point Barrow).

This species is abundantly represented in collections from Point Barrow, where it is reported by Murdoch as common at all seasons. Stone records 28 specimens (skulls) as collected there by the McIlhenny expedition. There are also specimens in the U. S. National Museum from St. Michaels, Alaska, and Plover Bay, Siberia, and Stejneger has recorded it from the Commander Islands. Specimens were collected for the American Museum by Mr. Buxton in the Okhotsk Sea, which differ in smaller size and weaker dentition from the Point Barrow specimens, and seem to represent a recognizable subspecies, described below. The Point Barrow specimens, collected by McIlhenny, which, through the kindness of the authorities of the Wistar Institute of Philadelphia, I have been able to examine, agree well with nearly as many Greenland (Davis Strait and Baffin Bay) specimens in the American Museum.

Phoca hispida presents a wide range of purely individual variation in the size and the structure of the teeth. The teeth vary in size in different specimens of the same sex from the same locality by fifty per cent, the teeth in some speci-

¹ *Phoca hispida* Schreber (pl. lxxxvi, 1775) has one year priority over *Phoca fætida* Fabricius (O. F. Müller's Zool. Dan. Prod., p. viii, 1776).

mens being twice as heavy as in others. An equally noteworthy variation is seen in the number of cusps on the teeth of the premolar-molar series. In the upper teeth pm^1 has usually two cusps, but sometimes three. The other teeth have usually three cusps, but pm^2 and pm^3 have often only two, the anterior cusp being wholly suppressed; quite as often pm^2 or pm^3 , or both, have four cusps, through the development of an anterior cusp and of two posterior cusps. Frequently the corresponding teeth on the two sides of the jaw vary in the number of cusps. While the difference is not sexual, extra cusps appear to be more frequently developed in the male than in the female.

In the lower teeth pm_1 and the molar usually have three cusps each, and pm_{2-4} have usually four each. The lower molar is of special interest in comparison with the lower molar in *P. vitulina*, *P. richardii*, and *P. ochotensis*, in which the number of cusps varies from three to four. In *Phoca hispida* in about 33 per cent of the skulls the molar has four cusps, and in the other 66 per cent only three cusps. In about 12 per cent the molar on one side of the jaw has three cusps and on the opposite side four cusps. The difference is not sexual, since males and females occur in both series.

5. *Phoca (Pusa) hispida gichigensis*, subsp. nov.

OKHOTSK SEA RINGED SEAL.

Type, No. 18276, ♀, young adult, Gichiga, Okhotsk Sea, Oct. 12, 1900; N. G. Buxton, Jesup North Pacific Expedition.

Similar to *P. hispida*, but very much smaller, and with relatively weaker dentition.

This subspecies is represented by two skins and their skulls, both young females, taken at Gichiga, on the western coast of the Okhotsk Sea. One of the skulls is complete; the other consists of only the lower jaw and the rostral portion of the skull, including the complete dentition.

The external measurements of one of the specimens (No. 18277) are as follows: Total length, 770 mm.; tail, 90; hind foot, 190. The other specimen, of which apparently no measurements were taken, is somewhat larger.

The type skull measures as follows: Basal length, 139 mm.; greatest zygomatic breadth, 86; mastoid breadth, 92; front edge of intermaxillæ to pterygoid hamuli, 75; front border of incisors to posterior border of

molar, 42; front of intermaxillæ to meatus auditorius, 96; palatal length (on median line), 58; palato-maxillary suture to anterior border of foramen magnum, 86; palatal width between the molars, 27.5; length of upper premolar-molar series, 29; length of nasals, 35; breadth of nasals at middle, 5.5; least interorbital breadth, 7; length of brain-case, 65; greatest width of brain-case, 82; length of lower jaw, 86; length of lower premolar-molar series, 30.

The skins have lain saturated with oil for nearly two years, and doubtless the general color has thereby been more or less altered. The upper surface is now yellowish brown, the sides and back inconspicuously marbled with dark brown or blackish; the spots are irregular in size and shape, and are often confluent. The ventral surface is yellowish white, wholly unspotted.

The small spotted seal of Bering Sea has commonly been referred to *Phoca hispida*. I have had before me some 30 or more skulls from Bering Sea and adjacent waters (5 from St. Michaels, 1 from Unalakleet, 1 from Port Clarence, 1 from Point Barrow, and 3 from Plover Bay, Siberia) which present no tangible differences from a large series from Greenland. On the other hand, the two female skulls from Gichiga are notably smaller, with relatively much weaker dentition. A larger series from the Okhotsk Sea might bridge over the difference in size, but there are strongly marked differences in other features. Although there is a wide range of individual variation in size among female skulls of *Phoca hispida*, I find none in the large series now available for examination as small as the two Gichiga skulls, in which the length is 12 to 15 mm. shorter than in average specimens of *P. hispida*.

More important differences consist in the much weaker dentition, and in the relative length of the premaxillary portion of the palatal floor and the correlated differences in the length and shape of the anterior palatine foramina. The upper toothrow is about one-tenth shorter than in the smallest Greenland and Bering Sea examples, and the teeth themselves are more than correspondingly less robust than this difference would necessarily imply, the teeth being very narrow in their transverse breadth and hence far more delicate in general size and structure.

The anterior palatine foramina are relatively much shorter and broader than in *P. hispida*, with a quite different contour,

shown especially in the more shallow hollowing of their anterior portion. Their shortness is due to the shortness of the premaxillary portion of the palate, which is one-fifth shorter than in *P. hispida*. In view of these differences the Okhotsk Sea form seems well entitled to subspecific recognition.

6. *Phoca ochotensis* Pallas.

OKHOTSK SEAL.

Figs. 5-6.

Phoca ochotensis PALLAS, Zoog. Rosso-Asiat. I, 1811, 117 (Okhotsk Sea).

Type of present description, No. 18169, ♀ ad., mouth of Gichiga River, Okhotsk Sea, Aug. 17, 1901; N. G. Buxton, Jesup North Pacific Expedition.

General color above yellowish olive-brown, profusely marked with small, irregular, dark brown and blackish spots, most numerous and largest over the median area; below yellowish or ochraceous brown, with fewer and more sharply defined spots of black. Tail dark above and much spotted, lighter and unspotted on the sides and below. Upper surface of feet heavily spotted, the lower surface without spots. Whiskers white, crenulate for the basal third, the apical portion straight and smooth; longest whiskers 75-90 mm. in length. Nails dark brown or blackish, long and narrow. The digits of the manus recede in length from the 1st to the 5th, the front border of the manus being much less square than in *Phoca vitulina* and *P. stejnegeri*. There seems to be no sexual difference in color and very little in size.

Measurements. — Total length, 1470 mm.; tail, 130; hind foot, 265. Two other males and a female range in total length from 1340 (female) to 1470 (male) mm.

Skull. — The skull is long and narrow in proportion to its breadth, with the rostral portion greatly attenuated in comparison with any of its allies, perhaps most resembling in general outline that of *Phoca grælandica*. The audital bullæ are very large and greatly inflated, the portion forming the meatus auditorius much produced and sharply constricted from the bulla, as in *Phoca grælandica*. The premaxillæ are in contact with the nasals for a short distance, and the frontals extend further forward along the nasals than in *P. vitulina*. The dentition differs strikingly from that of any of the allied species, the teeth being intermediate in stoutness between those of *P. grælandica* and *P. vitulina*, stand in a straight line, and are separated by well-marked diastema. The upper premolar-molar series are all bicuspid; there is a high main cusp, with the point curved backward, and a small accessory cusp behind it; in front of the main cusp the cingulum is strongly beaded, with, in some specimens, an incipient cusp. There is a similar tendency to the

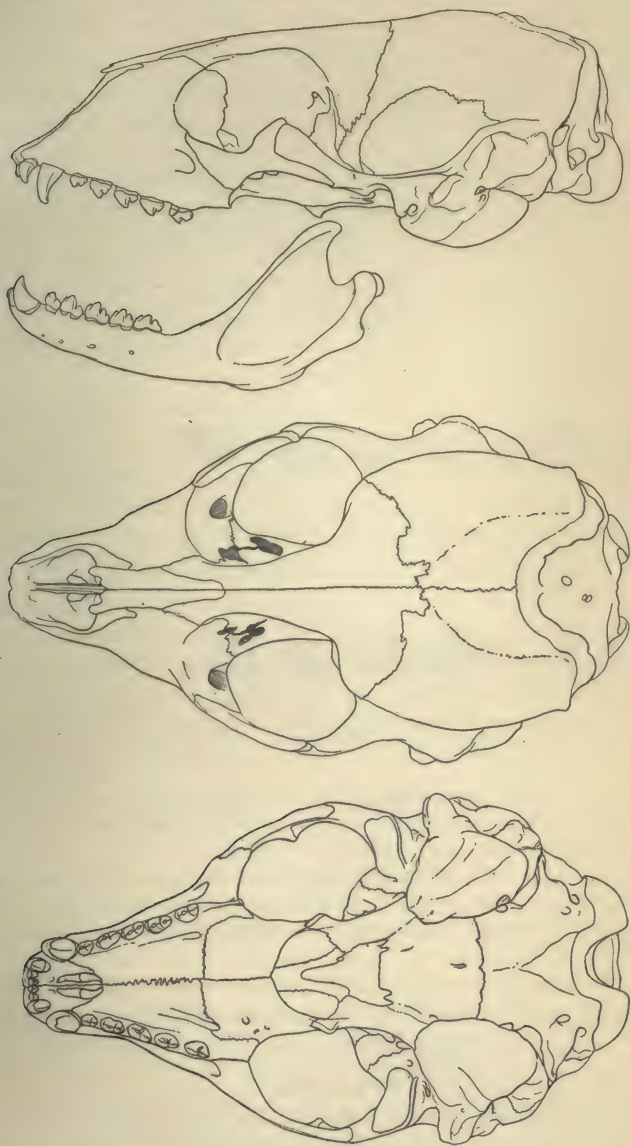


Fig. 5. *Phoca ochotensis*. Type of present description. Am. Mus. No. 18169, ♀ ad., Okhotsk Sea. Lateral, superior, and palatal views of skull. $\frac{2}{3}$ nat. size.
[December, 1902.]

development of a minute cusp behind the secondary cusp, especially on pm^3 and pm^4 . The posterior three lower teeth are generally 4-cusped.

The same irregularity in the number of cusps, already mentioned as occurring in *Phoca vitulina* and *P. richardii*, is found in *P. ochotensis*. The lower molar, however, appears to be pretty uniformly 4-cusped, with quite frequently an 'adventitious' cusp at the postero-inner base of the main cusp.

The only complete skull is that of the type, an adult female, which measures as follows: Basal length, 200 mm.; greatest zygomatic breadth, 114; mastoid breadth, 117; front border of premaxillæ to pterygoid

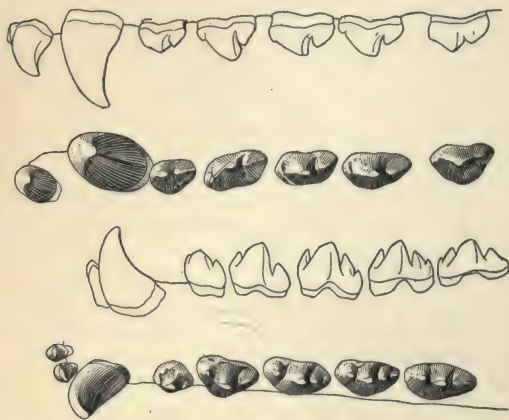


Fig. 6. *Phoca ochotensis*. Am. Mus. No. 18169. Outside and crown views of upper and lower teeth. Nat. size.

hamuli, 105; front-border of upper incisors to posterior border of upper molar, 67; front border of premaxillæ to meatus auditorius, 142; palatal length (along median line), 78; palato-maxillary suture to pterygoid hamuli, 44; palato-maxillary suture to interior border of foramen magnum, 130; palatal width between the molars, 42; length of uppertooththrow, 45;

length of nasals, 43; breadth of nasals at fronto-maxillary suture, 12; least interorbital breadth, 14; length of brain-case, 85; greatest width of brain-case, 91; length of lower jaw, 129; lower tooththrow, 46. The male skulls are imperfect; the parts preserved include the frontal portions, with the complete dentition, and indicate that the males are somewhat larger than the females, with rather heavier teeth.

This species is represented by five specimens (skins and skulls), collected by Mr. N. G. Buxton on the Taiganose Peninsula, 20 miles south of the mouth of the Gichiga River, August 17 and 18, and September 4, 1901.

In cranial and dental characters *Phoca ochotensis* is intermediate between *Phoca vitulina* and *P. grænländica*, but is widely distinct from either. Subgenerically it is a *Phoca* and

not a *Pagophilus*, lacking the flattened frontal region, the square palatal border, and extensively ossified narial septum of the latter, while the dentition is considerably heavier. In general form the skull is much more elongated and relatively much narrower than in *Phoca vitulina*, with markedly weaker dentition.

Pallas gave the name *Phoca ochotensis* to a small spotted seal found in the Okhotsk Sea, which he says was especially abundant between "Tanisk" and "Ishiga" (= Tansk and Gichiga of modern maps). His long description is not especially diagnostic, but seems to point to the present species, particularly in his reference to its slenderer and more graceful form as compared with its congeners. His description of the under parts as "subtus maculis subquadratis sparsis, obsolete testaceis, sub collo crebrioribus," is characteristic of the present species in contradistinction to *Phoca hispida gichigensis*, the only other form of *Phoca* known from the Okhotsk Sea. A definite type locality is given by Pallas, at which the present specimens were taken, and which are therefore topotypes. His statement "auriculæ externæ minutæ nigricantes" might seem to indicate an eared seal, but the whole tenor of his description shows conclusively that his *Phoca ochotensis* is a species of *Phoca*.¹ Besides, a minute blackish rim around the ear opening is distinguishable in the present specimens, and in one is quite noticeable. It is doubtless this to which he refers in describing the ear.

7. *Phoca ochotensis macrodens*, subsp. nov.

SIBERIAN SEAL.

Phoca largha STONE, Proc. Acad. Nat. Sci. Phila. 1900, 43 (Point Barrow, Alaska). Not *Phoca largha* of Stejneger, True, and others as applied to specimens from Bering Island, Pribilof Islands, etc.

Type, No. 83447, U. S. Nat. Mus., young adult (♂), Avatcha Bay, Kamschatka, 1896; Dr. L. Stejneger.

Similar in dental and cranial characters to *Phoca ochotensis* but with much heavier dentition, and the teeth less separated, especially in the lower jaw. The external characters are not known.

Skull. — Similar in general conformation to that of *Phoca ochotensis*,

¹ That he knew the eared seals is shown by his description of his *Phoca leonina* (= *Eumetopias jubata* = *E. stelleri* auct.) and *Phoca nigra*, which latter is based primarily on a young fur seal from the Kurile Islands, recently named *Callorhinus kurilensis*, but which must apparently be called *Callotaria nigra*.

the rostral portion of the skull being similarly narrow and elongated in comparison with the other species of *Phoca*. The type skull, which is apparently that of a 'young adult' male, measures as follows: Basal length, 205 mm.; greatest zygomatic breadth, 112; mastoid breadth, 117; front border of premaxillæ to pterygoid hamuli, 106; front border of upper incisors to posterior border of upper molar, 61; front border of premaxillæ to meatus auditorius, 143; palatal length (along median line), 78; palato-maxillary suture to pterygoid hamuli, 44; palato-maxillary suture to anterior border of foramen magnum, 128; palatal width between the molars, 39; length of upper tooththrow, 43.5; length of nasals, 45; breadth of nasals at fronto-maxillary suture, 11; least interorbital breadth, 11; length of brain-case, 85; greatest width of brain-case, 93; length of lower jaw, 128; lower tooththrow, 43. An adult skull, apparently female, is smaller, the principal dimensions being as follows: Basal length, 182; zygomatic breadth, 102; mastoid breadth, 106; front border of premaxillæ to pterygoid hamuli, 94; front border of premaxillæ to meatus auditorius, 128; palatal length (along median line), 70; palato-maxillary suture to foramen magnum, 115; palatal width between molars, 35; length of upper tooththrow, 40; length of nasals, 37; width of nasals at fronto-maxillary suture, 9; length of lower jaw, 112; lower tooththrow, 38.5.

This form ranges from the southeastern coast of Kamchatka north to Point Barrow, Alaska, and is represented by the following specimens, which are skulls only: Avatcha Bay, Kams., Nos. 83447 and 83448, U. S. Nat. Mus., apparently male and female, both adult but not old, collected by Dr. Stejneger in 1896; Plover Bay, Siberian side of Bering Strait, No. 6783, U. S. Nat. Mus. (formerly; now No. 6970, Mus. Comp. Zoölogy), collected by Col. Buckley; Point Barrow, Alaska, No. 16761, U. S. Nat. Mus., apparently ♀, collected by John Murdoch. Also three skulls, all collected by the E. A. McIlhenny Expedition (orig. Nos. 22 and 30, Acad. Nat. Sci., Philadelphia, and No. 5390, Wistar Institute, Philadelphia), and all labelled as female by the collector. Detailed measurements are given of all these skulls in the table on p. 497.

Phoca ochotensis macrodens differs from *P. ochotensis*, so far as the skulls are concerned, in the much greater size of the teeth, which, while the tooththrow is of the same length in both, are much larger and stand closer together, leaving much smaller diastema between those of the upper jaw, while in the lower jaw they are in close contact, and sometimes crowded, so that pm_2 is generally, and pm_3 is sometimes inserted

obliquely to the axis of the toothrow. The mandibular series thus closely resembles the teeth of the more delicate females of *Phoca richardii* and *P. vitulina*.

In this connection the Plover Bay skull is to me of special interest. It is a large and apparently very old male, which in 1880 (Hist. N. Am. Pinnipeds, pp. 572 and 579) I referred provisionally to *Phoca vitulina*, with the following comment: "My attention has been forcibly drawn to this matter [sexual variation] by a skull (No. 6783, Nat. Mus.) from Plover Bay (Siberian Coast of Behring's Straits), which I at first referred unhesitatingly to *Phoca vitulina*, when examined in connection with a large series from both the Atlantic and Pacific coasts of America, but later, when compared again with a smaller series, I thought it might represent a form closely allied to, but still specifically distinct from, *P. vitulina*—probably the so-called *Phoca 'nummularis.'* On collating it again with the full series first examined it seemed undoubtedly to be only an old female of *P. vitulina*. Aside from the slighter and more delicate structure of the skull, the most notable differences are the smaller, normally implanted, and even slightly spaced molar teeth, the narrowness of the facial portion of the skull, and the corresponding narrowness of the lower jaw and absence of the abrupt outward curvature of the rami at the last molar . . ." (*l. c.*, p. 572). This extract is here quoted as showing the chief points of difference between *Phoca vitulina* and *Phoca ochotensis* and its subspecies *macrodens*. This Plover Bay skull I now regard as an old male *P. ochotensis macrodens*, instead of a female *Phoca 'vitulina'* with exceptionally weak dentition and delicately developed skull. In other words, as regards dentition, there is a resemblance in the size and position of the teeth between males of *P. ochotensis* and females of *P. vitulina*.

8. *Phoca stejnegeri*, sp. nov.

BERING ISLAND SEAL.

Figs. 7-10.

Phoca largha STEJNEGER, Bull. U. S. Fish Comm. XVI, 1896, 21 (Commander Islands). No description. Not *Phoca largha* Pallas, sp. indet.

Type, Nat. Mus. No. 21310, ♂ ad., skull, Bering Island, April 16, 1883; Dr. L. Stejneger.

Similar in general features to *Phoca vitulina*, but much larger, and differing essentially in cranial and dental characters.

Light Phase. — Above deep straw yellow, profusely marked with very small sharply defined black spots, most numerous on the back, from the nose to the tail; ventral surface more sparsely spotted and general color deeper yellow. Whiskers yellowish brown, perhaps from staining, flattened, nodular for the basal half, the apical portion smooth, the longest about 90–100 mm. in length. Nails brownish black, rather short and stout. Those on the anterior digits range in length from 27 mm. on the 5th to 37 on the 1st; on the posterior digits the nails are too imperfect for measurement. The fore flippers are rather truncated, being less pointed than in *P. ochotensis*, the end of the 5th reaching to within 25–30 mm. of the end of the 1st, as against 50 mm. in *P. ochotensis*.

Dark Phase. — General ground color as in the light phase, but almost obliterated by the profuseness of the dark spots, which occupy about four fifths of the dorsal surface and rather more than one half of the ventral surface. Over the median third of the dorsal region the spots are more or less confluent, and are separated, when distinct, by very narrow, irregular spots and bands of the ground color; on the sides and below the spots are more separated and occupy only about one half of the general surface. On the limbs the dark markings form large patches, interspersed with much smaller areas of the ground color. Although the dark specimen (No. 114652, Tchipunski Bay, southeastern coast of Kamschatka) is a female, the difference is obviously not sexual, as one of the light specimens is also a female.

Young. — A young specimen (No. $\frac{1883}{1883}$, Bering Island), about one fourth grown (830 mm. long), has the ground color lighter than in the light phase of the adults — above yellowish gray profusely spotted with dusky, below pale yellow sparsely marked with dusky spots and blotches. The dark markings are more or less veiled with the lighter ground color and hence less sharply defined and grayish black rather than black, as in the adults. This specimen, though only a few weeks old, is about the size of a full-grown female *Phoca hispida*. The permanent dentition had barely cut the gums.

A foetal specimen (No. 13990, ♂, Bering Island, March 12, 1883), about 640 mm. long, has the general color pale yellow (white in life?), with a narrow dorsal brownish band, darkest on the head, lower part of back, and tail; upper surface of fore flippers dusky brown; hind flippers dusky grayish brown on both surfaces, less dark than upper surface of fore flippers.

External Measurements. — The principal external measurements, taken in the flesh by Dr. Stejneger, of four specimens killed on Bering Island and neighboring points on the Kamschatkan coast, are as follows:



Fig. 7. *Phoca stejnegeri*. Type: No. 21310 U. S. Nat. Mus., old ♂, Bering Island. Lateral, superior, and palatal views of skull. $\frac{2}{3}$ nat. size.

Orig. No. (Dr. Stejneger)	Nat. Mus. No.	Sex.	LENGTH		Tail.	Hind foot.
			Nose to end of tail.	Nose to end of hind flipper.		
2609	13986/38012, Staritshkof Is., Kams.....	♂ juv.	1545	1760	140	335
2610	13985/38011, Avatcha Bay, Kams.....	♂ juv.	1665	1880	145	350
2767	114652, Tchipunski Bay, Kams..	♀ juv.	1680	1870	135	330
2579	13988/38014, Petropaulski, Kams.....	♀ ad.	1850	2190	120	340

Skull. — The skull is fully twice as large as that of *Phoca vitulina*, from which it differs mainly, so far as general features are concerned, in its massiveness. The teeth are essentially the same as in the *P. vitulina* group (*Phoca* restr.), in which the dentition differs from that of the *Pusa* and *Pagophilus* groups in the large size of the crowded and more or less obliquely implanted teeth, the teeth in both *Pusa* and *Pagophilus* being small, placed in a straight line and separated by broad diastema. *P. stejnegeri* agrees with all of the other known Pacific and Bering Sea seals of the genus *Phoca* in the posterior extension of the premaxillæ to the side of the nasals, but differs from them in the possession of a groove in front of the infraorbital foramen for the maxillary nerve, which runs forward from the infraorbital foramen to a point opposite the middle of pm³. As this deep, strongly defined groove is present in all of the four skulls of *P. stejnegeri* available for examination, and is uniformly absent from some thirty or more skulls of *P. vitulina*, *P. richardii*, and *P. ochotensis*, it appears to be a character of some weight.

Dentition. — Another feature of importance is found in the character of the teeth, the superior premolars 2-4 being 4-cusped in the type skull, and apparently so in the two other adults, in which, however, the teeth are too much worn for satisfactory examination. In the young (female?) skull (No. 21311), these teeth have the same conformation as in *P. vitulina*.¹ In the lower jaw pm₂₋₄ are strongly 4-cusped, as is also the molar in two of the three adult skulls; in the third the molar on both sides of the jaw has been lost. In the lower jaw of the young skull pm₂₋₄ on both sides, and the molar on the right side, are distinctly 4-cusped, but the molar on the left side has only three cusps. In other words, *P. stejnegeri* seems to be separable from the *P. vitulina* group by the quadricuspid instead of tricuspid superior molariform teeth.

The premolars have the same oblique position as in *P. vitulina*, varying greatly, however, in this respect with the individual. In the three adult skulls from Bering Island only pm³ is obliquely implanted, but in

¹ The crowns of the teeth in the skulls Nos. 38011-38013 and No. 114652 have crumbled away, and these skulls therefore throw no light on the number of cusps and form of the teeth.

the young skull both pm^2 and pm^3 are set obliquely. In another very young skull (No. 38013) from Bering Island, pm^2 is strongly oblique and pm^3 is slightly oblique. In No. 114652, a young female, pm^2 on the left side is oblique, but the corresponding tooth on the right side, and all of the other premolars on both sides stand in a straight line. In No. 38011, a young adult male, from Avatcha Bay, all the upper premolars are set obliquely, while in No. 38012, also a young adult male, only pm^2 , on both sides, is set obliquely, all the other teeth standing parallel to the axis of the toothrow. In No. 38014, a female from Petropaulski, all of the teeth in both jaws are set in straight lines. Thus in the maxillary series pm^2 is always strongly oblique to the toothrow, and pm^3 more or less so in male skulls, while only pm^2 , and this apparently rarely, is placed obliquely in the female.

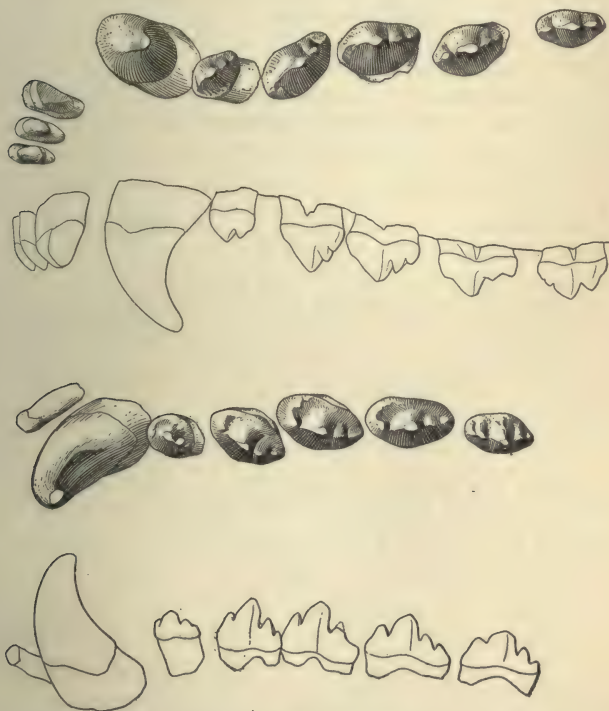


Fig. 8. *Phoca stejnegeri*. Type: U. S. Nat. Mus. No. 21310, old male. Crown and outside views of upper and lower teeth. Nat. size.

In the lower toothrow pm_2 and pm_3 and sometimes pm_4 have a position strongly oblique to the axis of the toothrow in both sexes, especially

pm₂ and pm₃, but the amount of obliquity is rather less in the female, and in one specimen (No. 38014) all of the lower premolars stand parallel to the axis of the tooththrow.



Fig. 9. *Phoca stejnegeri*, very young ♀ (?). U. S. Nat. Mus. No. 21311, Bering Island. Lower molars; the right lower molar in this specimen has four cusps, the left only three. Nat. size.

Measurements (type skull).—Basal length, 248 mm.; greatest zygomatic breadth, 150; mastoid breadth, 139; front border of premaxillæ to pterygoid hamuli, 134; front border of upper incisors to posterior border of upper molar, 80; front border of premaxillæ to meatus auditorius, 235; palatal length (along median line), 103; palato-maxillary suture to pterygoid hamuli, 49; palato-maxillary suture to anterior border of foramen magnum, 148; palatal width between the molars, 50; length of upper tooththrow, 52; length of nasals, 61; breadth of nasals at fronto-maxillary suture, 15; least interorbital breadth, 17; length of brain case, 91; greatest width of brain case, 100; length of upper jaw, 158; length of lower tooththrow, 50.

Five additional skulls are available for measurement as regards the principal dimensions which, with the corresponding measurements of the type, may be tabulated as follows:

Nat. Mus. No.	Sex and age.	Locality.	Basal length.	Zygo-matic breadth	Mas-toid breadth
21310 ¹	♂ very old.	Bering Island.....	248	150	139
21311	juv.	" ".....	190	118	118
21312	very old.	" ".....	225	145	127
21335	♀ ? very old.	" ".....	222	118	—
38012	♂ juv.	Staritshof Isl., Kams.....	230	126	137
38011	♂ "	Avatcha Bay, Kams.....	228	137	136

The skulls of Nos. 38011 and 38012 have not been cleaned, and the teeth have suffered much injury from long immersion (with the skins) in a preservative solution, but it is evident that both specimens are merely 'young adults' which had not attained their full size.

Phoca stejnegeri is a member of the *P. vitulina* group, from other forms of which it differs by its much larger size (see fig. 10, p. 494, for relative size of bullæ), and in certain well-marked characters of the skull and teeth, as already detailed. It is doubtless as variable in coloration as is *Phoca richardii* and *P. vitulina*², at least in some of its phases.

¹ Type.

² On the color variations of *Phoca vitulina* cf. Allen, Hist. N. Am. Pinnipeds, 1880, pp. 562-564.

This very distinct species is represented by four skulls from Bering Island, one of which is labeled male, but the sex of the others is not designated. Three of the skulls are very old and massive, especially the one marked male, and the other is very young, probably a yearling. In addition to these four skulls there are six skins, five of which have skulls, representing four 'young adults' (two males and two females), a foetal specimen (without skull), and a young specimen, probably a month to six weeks old. The skins, with their skulls, have lain for eighteen years in a vat of preservative fluid (Hornaday solution); the skins on being removed from 'pickle' and prepared for examination are in fair condition, though possibly the ground color is a little discolored from staining; the skulls, however, have greatly deteriorated from the action of the solution, the bones having become softened from loss of calcareous matter, and the teeth have mostly crumbled off down to the alveoli. There is enough left of them to show their manner of insertion, and two of the skulls are susceptible of measurement as regards their general proportions; the other three are imperfect, only the rostral portion and the lower jaws being preserved. The two young specimens are from Bering Island, the adults from localities on the neighboring coast of Kamschatka,—one each being from Petropaulski, Staritshof Island, and Avatcha and Tchipunski Bays. They were all collected by Dr. Leonhard Stejneger in 1883, and of the specimens represented by skins, detailed measurements were taken by him from the fresh specimens, and form a part of the material of the present investigation. It therefore gives me great pleasure to connect his name with this fine large seal, as a slight recognition of his invaluable contributions to the natural history of the Commander Islands and neighboring regions.

9. *Phoca richardii* Gray.

PACIFIC HARBOR SEAL.

Halicyon richardii GRAY, P. Z. S. 1864, 28, fig. 1, skull (Vancouver Island); Cat. Seals and Whales, 1866, 30, fig. 9; Hand-list Seals and Whales, 1874, 4. — GILL, Proc. Essex Inst., V, 1866, 13 (ex Gray).

[*Phoca*] *richardsi* SCLATER, P. Z. S. 1873, 556, footnote (emendation of name).—ALLEN, Bull. Am. Mus. Nat. Hist. XVI, 1902, 225 (Alaska Peninsula).

Phoca pealii GILL, Proc. Essex Inst. V, 1866, 13 ("California and Oregon"). Not *Phoca pealii* Gill, *ibid.*, p. 4, footnote = *Halichærus antarcticus* Peale.

Phoca pealii? SCAMMON, Marine Mamm. 1874, 164, pl. xxii, animal.

Phoca vitulina CLARK, P. Z. S. 1873, 556 (on Gray's type specimen of *Halicyon richardi*).—ALLEN, Hist. N. Am. Pinnipeds, 1880, 559, in part (Pacific Coast references only).—ELLIOTT, Seal Islands of Alaska, 1882, 28, pl. iv, in part (Pribilof Islands).—NELSON & TRUE, Rep. Nat. Hist. Coll. Alaska, 1887, 264, in part (St. Michaels, mainly).

Phoca vitulina var. *largha* NORDQUIST, Vega-Exped. Vetensk. Iakt. II, 1883, 102 (reference to skulls from Unalashka in the St. Petersburg Zoölogical Museum).

Phoca largha? TRUE, in Jordan's Rep. Fur-Seal Islands, Part III, 1899, 351 (Pribilof Islands).

The only specimens available for examination from anywhere near the type locality are two skulls from Puget Sound (Nat. Mus. Nos. 6535 and 6159), one of them badly broken, and another (Nat. Mus. No. 6486) from "Washington Territory," the two latter quite young, and all unmarked as to sex. Judging by the size and shape of the teeth the two young specimens are both females, and agree closely in every respect with specimens from the New England coast of corresponding age and known to be females, except in the single character of the greater posterior extension of the premaxillæ so as to touch the nasals.

Another skull from Yakutat Bay, Alaska (Nat. Mus. No. 98139), slightly older and unmarked for sex, is also similar; the dentition is weak but the lower molar is distinctly 4-cusped. A young skull from Kenai, Alaska (Nat. Mus. No. 9480) is like the two skulls from the Puget Sound region. Another skull from Adakh Island, Alaska (Nat. Mus. No. 14399), is very young and probably a male, pm2 and pm3, both above and below, being set very obliquely, and the lower molar being strongly 4-cusped.

Next in geographical sequence are four very young skulls from St. Michaels, Alaska (Nat. Mus. Nos. 21474-21477). Three of them appear to be females, the dentition being light

and the lower molar 3-cusped. The fourth (No. 21476) has the teeth heavier, much more crowded, and the lower molar is 4-cusped.

There is nothing to suggest, in view of the normal variability of the skulls and teeth in this and allied groups of seals, that the above enumerated ten skulls are not all referable to the same species. They are all 'young adults,' except the broken Puget Sound skull and the Yakutat specimen, which are adult, but not old.

In addition to the above are three skulls from the Pribilof Islands (Nat. Mus. Nos. 15276, 49550, 101330). The latter is much the younger and seems to be a female, on the basis of its light structure, small and non-obliquely set teeth, but the lower molar is strongly 4-cusped, a feature more commonly found in the male. Skull No. 49550 is larger and also much older, with the teeth heavier and more crowded, and the lower molar is tricuspid. No. 15276 is a very old skull (without lower jaw), and the teeth are very much worn, little but the roots being left. Its general appearance indicates it to be an extremely old male. The teeth, however, all stand in a straight line.

No. 6157 (Mus. Comp. Zool.), from Santa Barbara Islands, California, is an exceedingly old, heavily ossified skull, almost beyond question male. The teeth are exceedingly heavy and very little worn; pm2 and pm3 are very obliquely set in both jaws; the lower molar is distinctly 4-cusped on the left side and indistinctly so on the right side. Compared with No. 15276 from Pribilof Islands, it is more heavily ossified, the teeth are much larger, and pm2 and pm3 much more obliquely set; the teeth are not much worn, while in the Pribilof skull they are exceedingly worn.

As these pages are passing through the press I have received from Dr. C. Hart Merriam, Chief of the Biological Survey of the U. S. Department of Agriculture, four adult skulls—two male and two female—of *Phoca* collected at San Geronimo Island, off northern Lower California, by Mr. A. W. Anthony, in September, 1896, for the Biological Survey. These skulls agree closely with the Santa Barbara skull above

described in their large size and heavy dentition in comparison with true *Phoca richardii* from further north, and with the Pribilof Islands skulls. They present no other very appreciable differences than greater massiveness in general structure and dentition. The lower molar is 3-cusped in both rami of one of the males, and faintly 4-cusped on the left side and 3-cusped on the right side in the other; in one of the females the lower molar is 4-cusped in both rami, and in the other 4-cusped on the right side and 3-cusped on the left side—showing, if further evidence were needed, that the variation in the number of cusps in the lower molar is a feature merely of individual variation and not a sexual, and much less a specific character.

Phoca richardii differs from *Phoca vitulina* from the east coast (= *P. concolor* Dekay) of North America only in the slightly greater posterior prolongation of the premaxillæ, giving them a slightly more extended contact with the nasals; this feature, while somewhat variable, will suffice to distinguish the two forms at a glance. In the general conformation of the skull and in dentition the two forms are indistinguishable.

Phoca richardii differs from *Phoca stejnegeri* through the much smaller size and much less massive character of the skull, as shown in the table of measurements (p. 498), where, in a note to the table, attention is called to strictly com-

parable specimens of the two forms. The auditory bullæ, for example, in No. 21311, from Bering Island, a very young skull with all the sutures open, are twice the size of the auditory bullæ in No. 15276, from the Pribilof Islands, a very old skull with the crowns of the teeth almost wholly worn away.

Phoca ochotensis has a skull so much slighter in structure

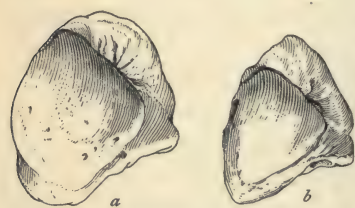


Fig. 10. Comparative views of right auditory bulla of *Phoca stejnegeri* and *Phoca richardii*. a, *P. stejnegeri*, U. S. Nat. Mus. No. 21311, young female (?), probably less than a year old; b, *P. richardii*, U. S. Nat. Mus. No. 6486, a 'young adult' female.

and so different in proportions and dentition from *P. richardii* that no comparison of the two is necessary.

10. *Phoca richardii pribilofensis*, subsp. nov.

PRIBILOF HARBOR SEAL.

Phoca largha ? TRUE, in Jordan's Rep. Fur-seal Islands, Part III, 1899, 351 (Pribilof Islands).

Type, Nat. Mus. No. 49550, ♀ (?) ad., Pribilof Islands, Alaska; C. H. Townsend.

The material now at hand affords a rather meager basis for separating the *Phoca richardii* group into subspecies, although its range extends from northern Lower California to the Pribilof Islands. Old skulls, comparable as to age, from the extreme points differ notably in the size of the teeth. As far as the present material goes the dentition appears to be decidedly and uniformly weaker in Alaska specimens than in those from the Puget Sound region, the type locality of *Phoca richardii*, and the northern form may without doubt be properly recognized subspecifically, on the basis especially of the Pribilof Island skulls.

An adult female skin (Nat. Mus. No. 82223), from St. Paul Island, collected by Mr. C. H. Townsend, has the under surface pale ochraceous, varied with paler streaks, and blotched rather indistinctly with dusky, the spots blacker and more distinct on the throat and sides of the neck; sides paler and more heavily and sharply blotched with blackish. The general color of the dorsal surface is silvery yellowish white, profusely marked with dark brown and blackish, the spots confluent over much of the median dorsal area, especially from the top of the head posteriorly to the middle of the back, over which extensive area the general color is blackish. This coloration, however, is not distinctive, as I have seen quite similar specimens from the Santa Barbara Islands.

11. *Phoca richardii geronimensis*, subsp. nov.

SAN GERONIMO HARBOR SEAL.

Type, U. S. Nat. Mus. No. 81520, ♂ ad., San Geronimo Island, Lower California, Sept. 13, 1896; A. W. Anthony.

The Lower California and Santa Barbara Islands form, so far as at present represented, is larger than the Pribilof

Island seal, with the dentition heavier than even that of Puget Sound specimens. In the material now in hand it is represented by a single skull (Mus. Comp. Zoöl. No. 6157), and a stuffed specimen (in the American museum), mounted with the mouth open, displaying the teeth, and by the four San Geronimo Island skulls. That these represent a well-marked subspecies there can be little doubt, characterized by large size and heavy dentition.

The table of measurements of 12 skulls of *Phoca 'vitulina'* (p. 499) from the eastern coast of North America is added for comparison with the Pacific Coast and Bering Sea skulls, from which it will be seen how closely the Atlantic coast skulls parallel those of the *Phoca richardii* group in general size and proportions, and also in details. The large size of the few Greenland specimens is also noteworthy in comparison with those from the New England coast. The first five given in the table are strictly comparable as to age. Most of the New England skulls, however, are young adults. Much more material will doubtless soon be available from the Atlantic coast, when it will be possible to study more satisfactorily this group of Harbor Seals.

MEASUREMENTS OF SKULLS OF *PHOCA OCHOTENSIS*, AND *P. O. MACRODENS*.

Mus. No.	Sex and Age.	Locality.	Basal length.	Zygom. breadth.	Mastoid breadth.	Front bord. of premax. to pteryg. hamuli.	Front border incisors to post. border molar.	Front bord. premax. to post. border molar.	Palatal length on median line.	Palato-max. suture to foramen mag.	Palatal width between molars.	Length of upper tooth-row.	Length of nasals.	Least interorbital breadth.	Length of brain-case, ¹	Greatest width of brain-case.	Length of lower jaw.	Length of lower tooth-row.
18169 A ¹	ad.!	Okhotsk Sea.....	200	114	117	105	67	142	78	130	42	45	43	9	85	91	120	—
18172 A	juv.!	".....	—	—	—	100	59	—	75	—	38	43	40	0	—	—	122	40
18170 A	juv.!	".....	—	—	—	—	65	—	—	—	—	44	—	—	—	—	129	43
83447 N ²	yg. ad.	Avatcha Bay.....	205	112	117	106	61	143	78	128	30	43	45	11	85	93	128	43
83448 N	ad.	".....	182	102	106	94	57	138	70	115	35	40	37	11	70	86	112	38.5
6783 N	ad.	Plover Bay, Siberia.....	213	108	123	106	67	143	78	133	35	46	40	11	85	90	—	—
16761 N	ad.	Point Barrow, Alaska.....	195	109	117	104	61	140	81	124	36	43	41	11	79	86	—	—
5390 P	ad.	".....	—	115	—	—	—	—	84	124	44	43	40	12	81	—	—	—
22 P	ad.!	".....	183	105	—	93	58	128	73	115	30	42	41	10.5	81	93	134	43
30 P	ad.!	".....	198	100	106	90	50	123	68	113	35	39	38	11	73	88	108	40
																	111	38.5

¹ Type of present description of *Phoca ochotensis*.² Type of *Phoca ochotensis macrodens*.

A = Am. Mus. Nat. Hist. N = Nat. Mus. P = Acad. Nat. Sci. Phila.

MEASUREMENTS OF SKULLS OF *PHOCA RICHARDII* AND *P. STEJNEGERI*.

	Nat. Mus. No.	Sex and Age.	Locality.	Basal length.	Zygomatic breadth.	Mastoid breadth.	Front border of premax. to pteryg. hamuli.	Front border of incisors to post. border molar.	Front border of premax. to meatus audit.	Palatal length on median line.	Palato-max. suture to foramen mag.	Breadth of rostrum at canines.	Palatal width between molars.	Length of upper tooth-row.	Length of nasals.	Least interorbital breadth.	Length of brain-case.	Greatest width of brain-case.	Length of lower jaw.	Length of tooth-row.
<i>Phoca richardii</i>	15276	?	Pribilof Islands.	214	136	127	113	65	157	74	124	41	46	45	56	14	84	94	—	—
	40550 ¹	?	"	203	123	123	110	65	143	81	118	40	47	45	47	14.5	80	94	131	44.5
	101330	?	"	188	107	112	95	61	132	72	115	32	42	44.5	43	14	77	90	107	43.5
	981330	?	Yakutat Bay, Alaska.	193	107	113	98	62	135	73	115	33	43	44	43	10	75	80	121	41
	14399	yg.	Adakh Island.	160	95	101	79	50	99	61	93	31	35	38	3	14	73	85	96	40
<i>Phoca richardii</i>	6486	yg.	Washington.	167	98	105	84	59	117	63	102	33	38	40	12	73	85	—	—	—
	61576	?	Santa Barbara Island.	225	142	135	110	71	167	95	134	45	46	43	15	82	81	96	143	44
	81522 ²	?	"	225	134	131	110	68	145	91	135	48	47	55	15	82	95	44	143	45
	81515	?	San Geronimo Is., L. Cal.	—	130	—	122	69	—	92	—	46	45.5	—	—	—	92	37	122	39.5
	81518	?	"	103	131	120	105	59	139	77	120	42	45	40	12	79	92	37	122	39.5
<i>Phoca stejnegeri</i>	81517	?	"	126	—	100	—	62	145	81	—	41	42	50	10	—	30	127	41.5	—
	21310 ³	?	Bering Island.	250	149	139	136	85	185	103	149	51	51	53	62	17	90	97	167	50
	21312	?	"	223	145	125	116	77	168	84	134	48	53	48	15	—	84	88	149	—
	21335	?	"	223	—	—	118	74	167	90	132	43	47	48	15	—	83	—	145	46
	21311	yg.	"	190	110	117	—	65	127	81	110	36.5	43	44.3	—	—	79	92	116	44

¹ Type of *Phoca richardii pribilofensis*.² Type of *Phoca richardii geronimensis*.³ Type of *Phoca stejnegeri*.

NOTE.—Nos. 15276 and 21310, 14399 and 21311 are strictly comparable as to age and probably are of the same sex. The first two are very old, and the last two are very young, apparently not more than five or six months old.

MEASUREMENTS OF SKULLS OF PHOCA 'VITULINA.'

Mus. No.	Sex and Age.	Locality.	Basal length.	Zygomatic breadth.	Mastoid breadth.	Front border of premax. to pteryg. hamuli.	Front border of incisors to post. border of molar.	Front border of premax. to meatus audit.	Palatal length on median line.	Palato-max. suture to foram. mag.	Palatal width between molars.	Length of upper tooth-row.	Length of nasals.	Least interorb. breadth.	Length of brain-case.	Width of brain-case.	Breadth of rostrum at canines.	Length of lower jaw.	Length of lower tooth-row.
100 A	?	Greenland.....	235	147	129	126	72	170	95	137	48	48	65	13	85	98.51	154.46	154.46	
4713 N	very old.	Sable Island, N. S.....	225	137	124	121	67	161	86	133	45	—	64	13	84	97.41	144.43	144.43	
3634 N	"	"	225	144	125	124	73	161	88	131	47	49	67	12.5	85	99.45	—	—	
102 A	"	Provincetown, Mass.....	216	128	121	110	62	141	79	119	47	45	58	14	83	97.40	134.43	134.43	
5144 C	"	Beverly, Mass.....	217	139	127	117	75	163	80	—	—	—	60	15	82	92.45	135	135	
3506 N	? yg.	Greenland.....	179	99	105	86	53	115	62	—	36	38.5	41	12	77	88	105.38.5	105.38.5	
1037 A	"	Holsteinberg, Greenland.....	174	103	100	88	57	117	68	104	38.5	40	42	10	77	91.31.5	111.37.5	111.37.5	
8283 N	juv.	Maine.....	160	102	105	87	58	120	69	96	39	40	48	14	75	87.31.5	100.39.5	100.39.5	
8282 N	"	"	169	98	104	87	56	119	67	96.5	36	41	43	11.3	72	87.31	100.40	100.40	
15900 A	"	"	171	100	106.5	94	58	120	73	102	36	40	45	12	75	88.31.5	112.40	112.40	
14442 A	"	"	171	99	107	88	55	123	65	102	38	37.5	48	12	77	87.30	111.37	111.37	
6271 A	"	"	168	99	103	87	56	120	65	98	38	40	46	14	73	86.34	100.40	100.40	

A = Am. Mus. Nat. Hist. N = Nat. Mus. C = Mus. Comp. Zool.





Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1-228, pll. i-iv, and 297 text figures. May, 1900. Price, \$5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1-54. June, 1900. Price, \$1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55-75, pll. i-v, and 9 text figures. January, 1901. Price, \$1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1-79, pll. i-xxxiii, and 24 text figures. December, 1901. Price, \$3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1-5, pll. 1-28. August, 1900. Sold by subscription, price \$6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Paleontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Paleontological Collection of the Geological Department.'

Volume I, 1881-86.....	Price, \$5.00	Volume XI, Part I, 1898, Price, \$1.25	
" II, 1887-90.....	" 4.75	" " " II, 1899 " " 2.00	
" III, 1890-91.....	" 4.00	" " " III, 1900 " " 2.00	
" IV, 1892.....	" 4.00	" " " IV, 1901 " " 1.75	
" V, 1893.....	" 4.00	" " (Complete). " " 5.00	
" VI, 1894.....	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895.....	" 4.00	" XIII, 1900.....	" 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	" 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901 " " 3.00	
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, \$1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

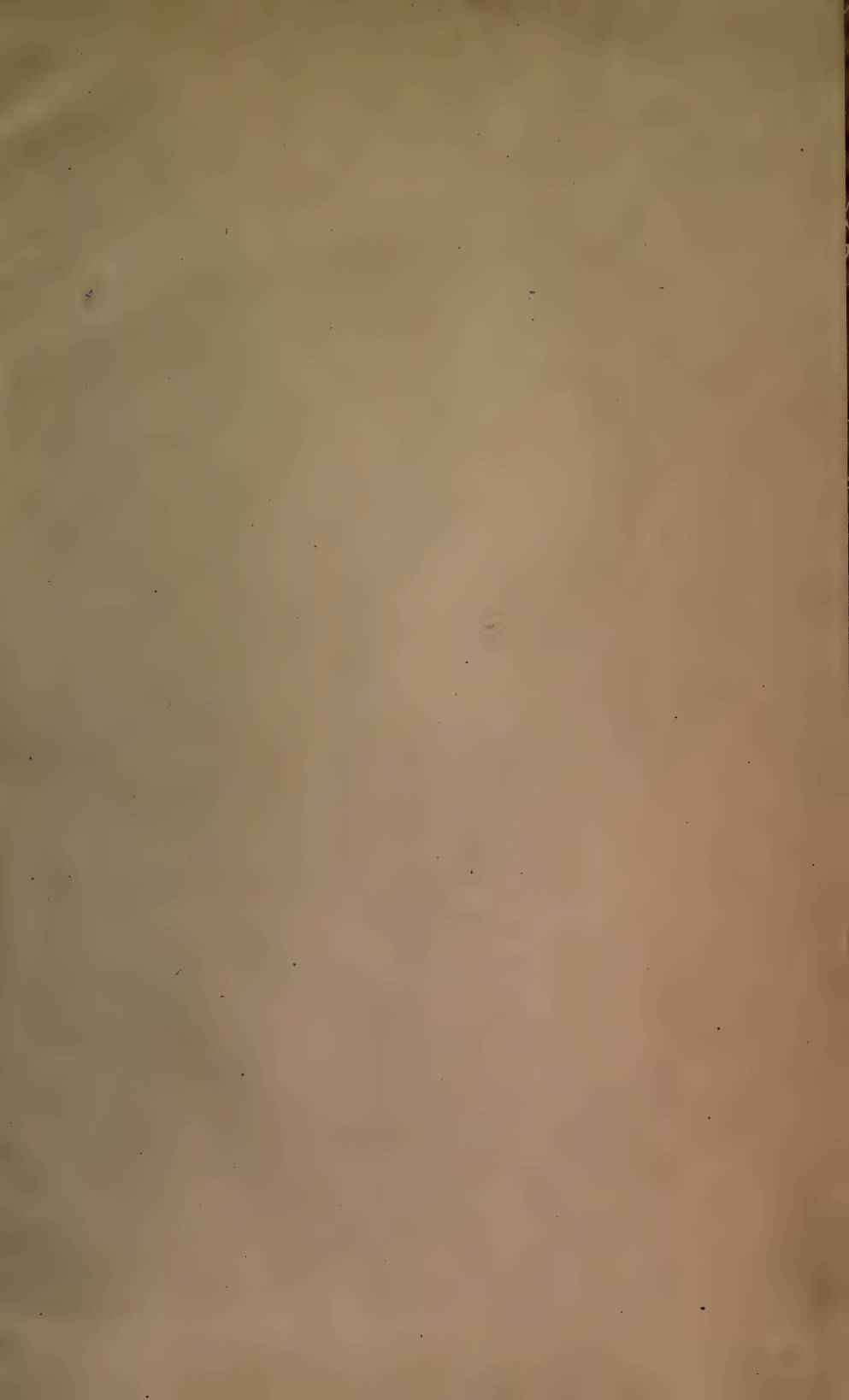
- PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1-37, pll. i-iii, and 14 text cuts. September 15, 1893. Price, \$2.00.
- PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39-74, pll. iv-xii. August 10, 1895. Price, \$2.00.
- PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75-164, pll. xiii-xx, and 49 text cuts. April 22, 1898. Price, \$4.20.
- PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165-188, pll. xxi-xxiii, and 15 text figures. October 25, 1899. Price, \$2.00.
- PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189-214, pll. xxiv-xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, \$2.00.
- PART VI.—Monograph of the Sesiidae of America, North of Mexico. By William Beutenmüller. Pp. 215-352, pll. xxix-xxxvi, and 24 text cuts. March, 1901. Price, \$5.00.
- PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353-447, pll. xxxvii-xxxix, and 34 text cuts. November, 1901. Price, \$3.00.

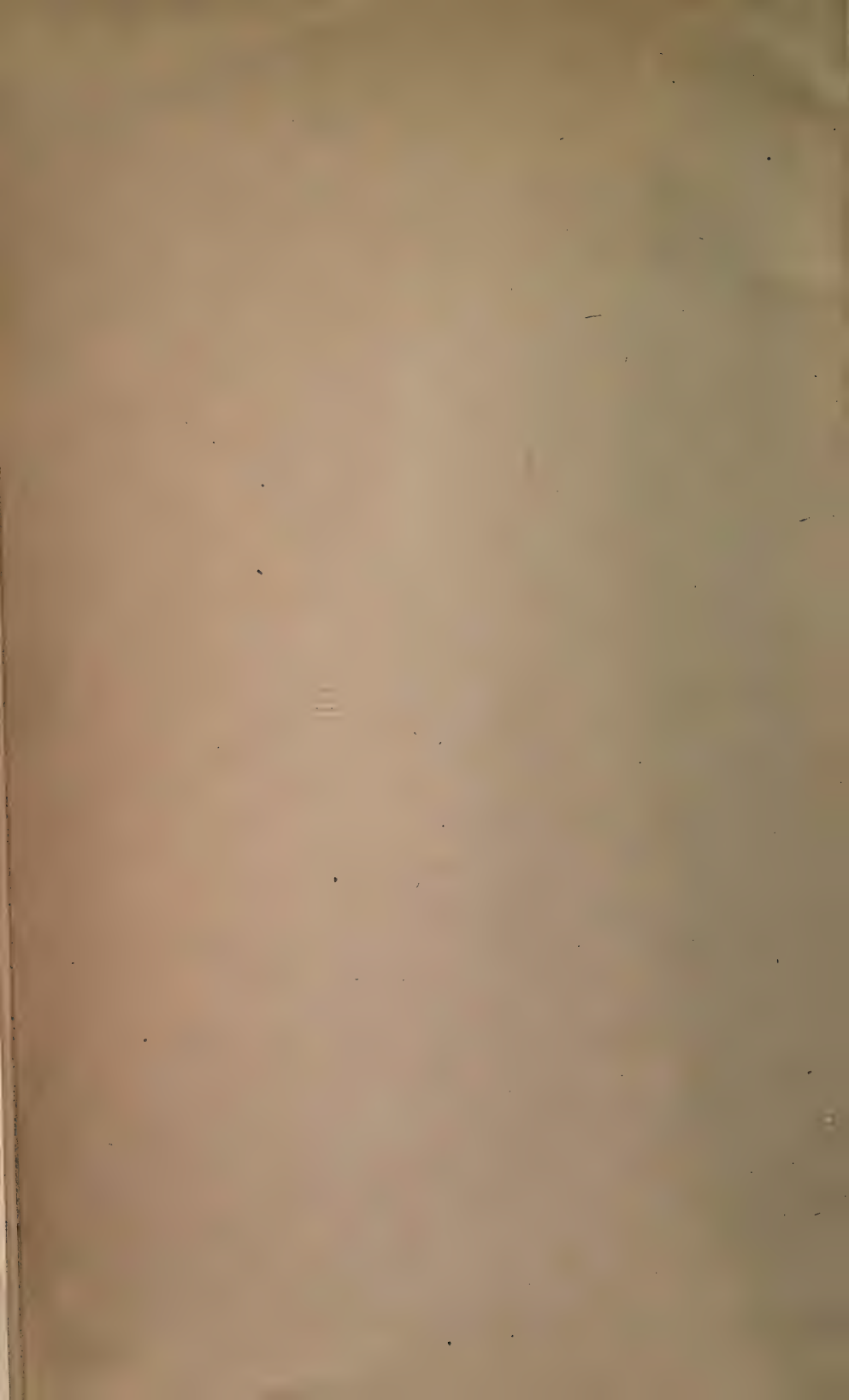
Vol. II. Anthropology.

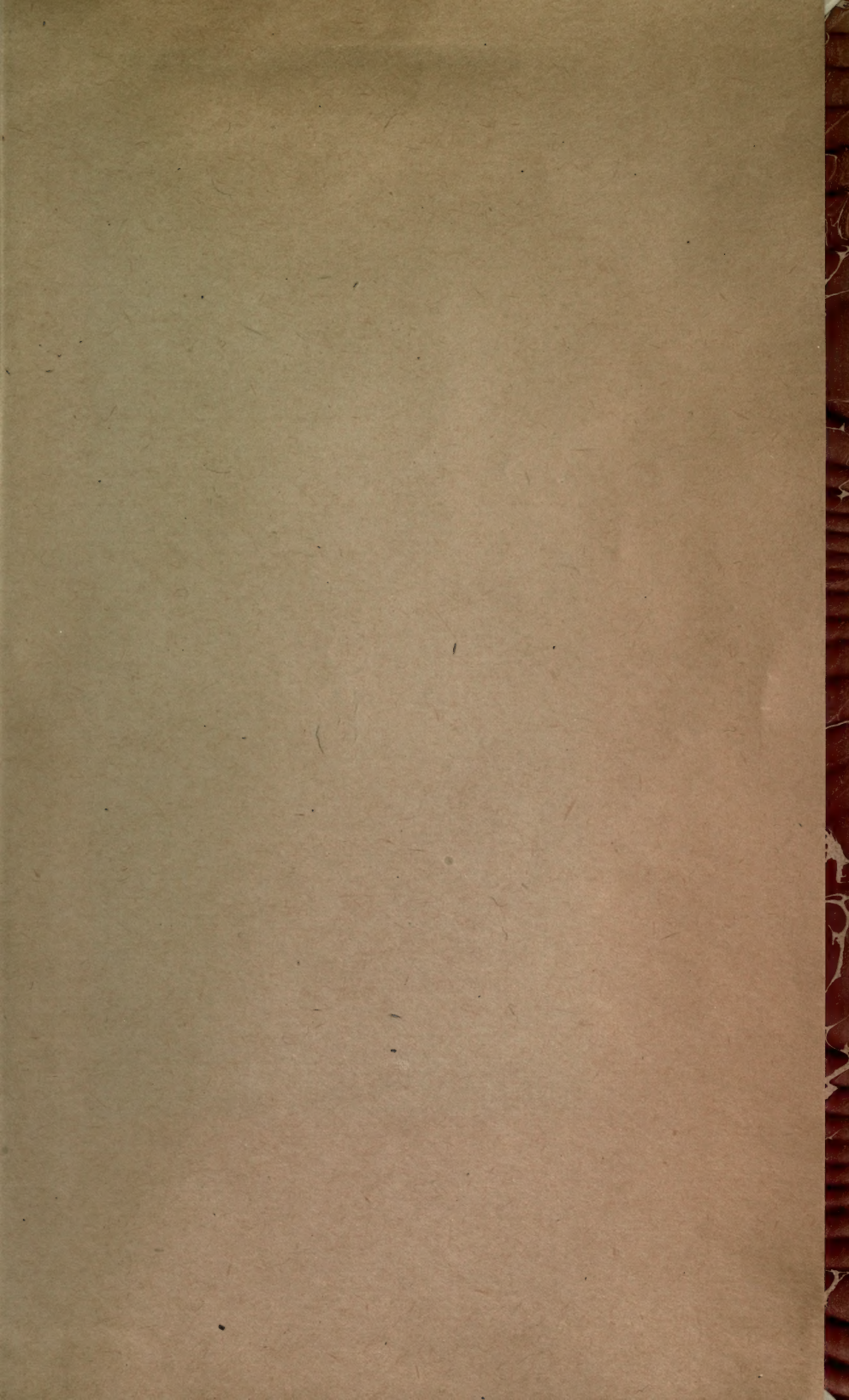
Jesup North Pacific Expedition.

- PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1-24, pll. i-vi. June 16, 1898. Price, \$2.00.
- PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25-127, pll. vii-xii. November, 1898. Price, \$2.00.
- PART III.—The Archaeology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129-161, pl. xiii, and 117 text figures. May, 1899. Price, \$2.00.
- PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163-392, pll. xiv-xx, and 198 text figures. April, 1900. Price, \$5.00.
- PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393-399, pll. xxi-xxiii, and 15 text figures. April, 1900. Price, 75 cts.
- PART VI.—Archaeology of the Thompson River Region. By Harlan I. Smith. Pp. 401-442, pll. xxiv-xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, \$2.00.

(Continued on 3d page of cover.)







THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

AN INITIAL FINE OF 25 CENTS

WILL BE ASSESSED FOR FAILURE TO RETURN
THIS BOOK ON THE DATE DUE. THE PENALTY
WILL INCREASE TO 50 CENTS ON THE FOURTH
DAY AND TO \$1.00 ON THE SEVENTH DAY
OVERDUE.

BIOLOGY LIBRARY

JAN 8 1936

NOV 10 1935

FEB 24 1939

JUL 17 1939

JUL 25 1939

JAN 3 1944

LD 21-100m-8,'34

QL701
A5
BIOLOGY
LIBRARY
G

198483

Allen

